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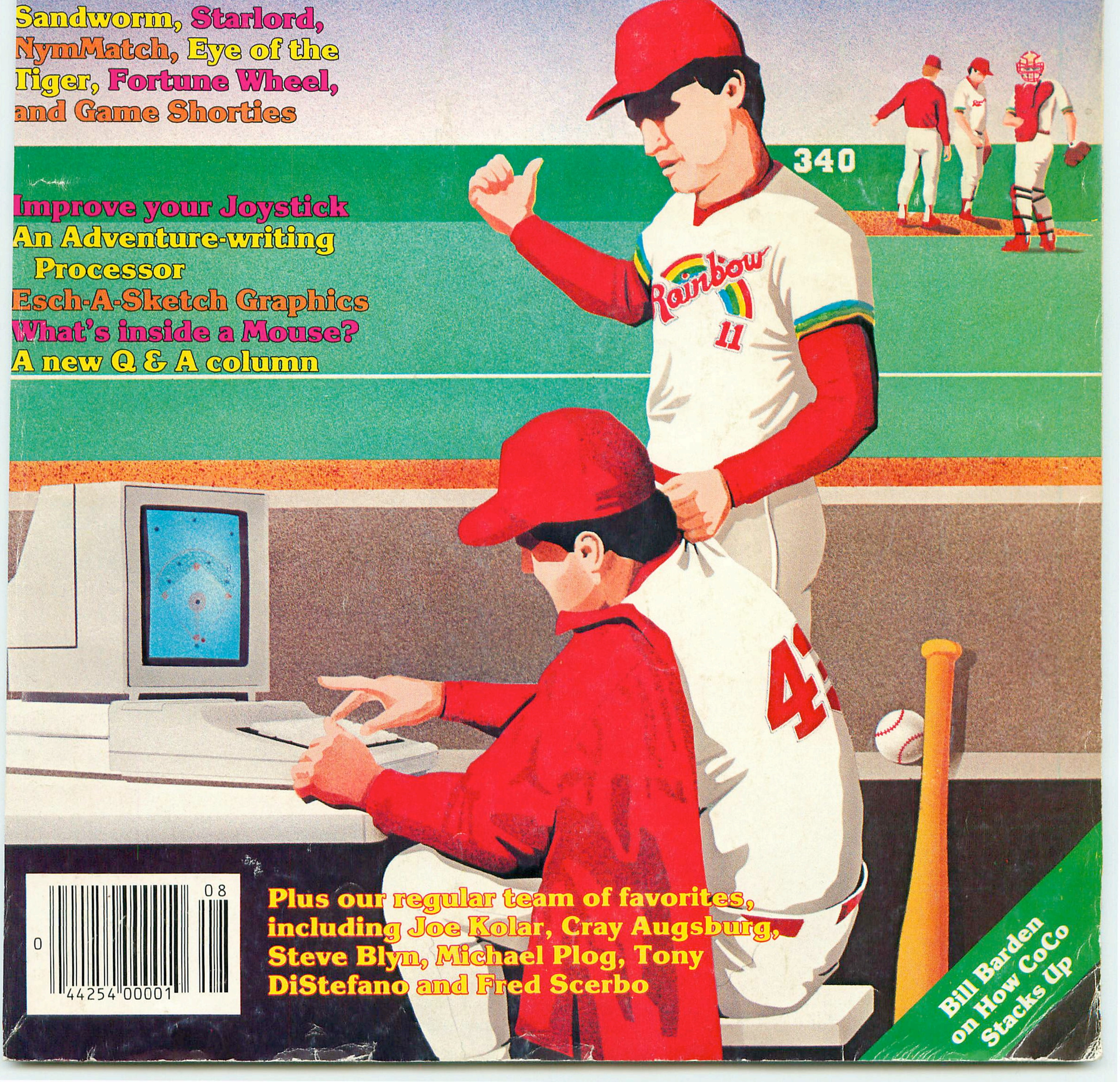

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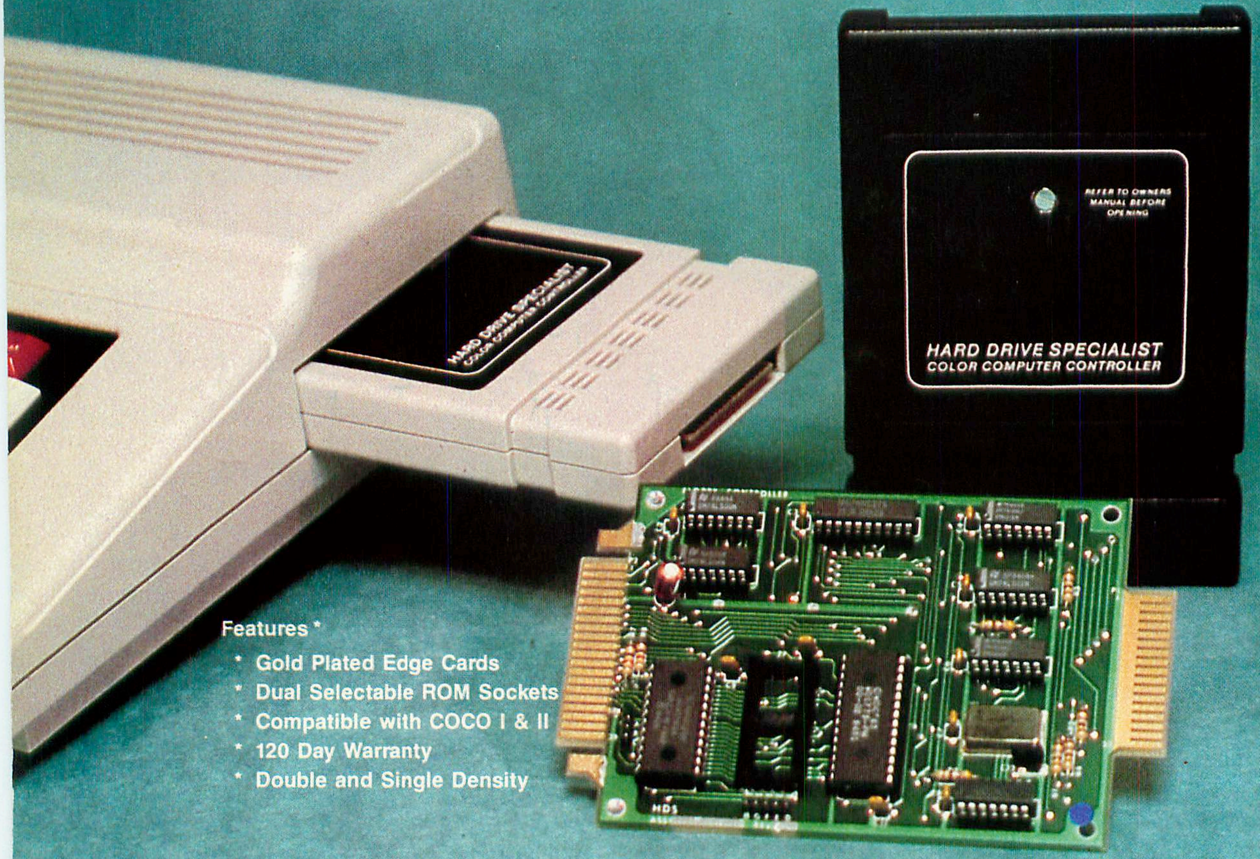
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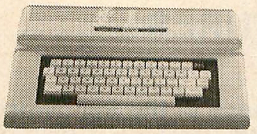

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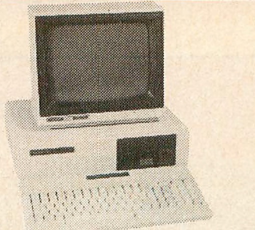

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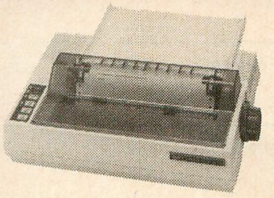

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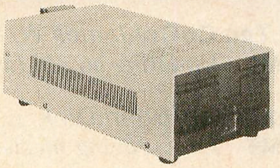

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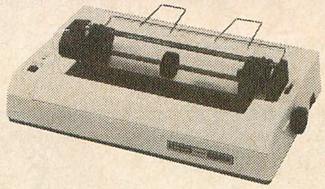

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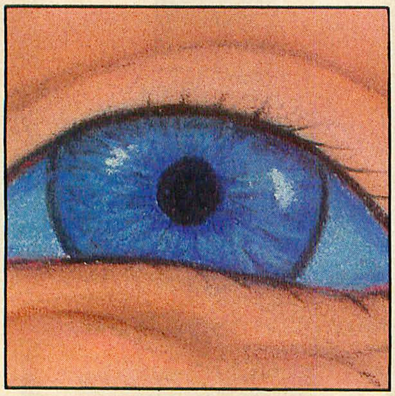

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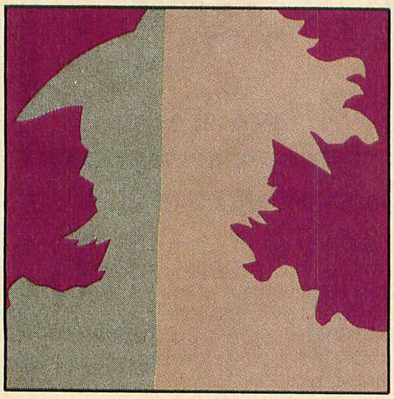

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NEXT MONTH: Sharpen your pencils and put on the old thinking cap because school days are just around the corner! Along with new shoes and lunch boxes, September also brings the RAINBOW Education issue. Keeping abreast of current thinking is important in today's fast-paced world and THE RAINBOW is here to help.

We'll have educational features for all ages — from preschoolers to graduate students and beyond. Even old pros will discover many things of interest in THE RAINBOW's regular columns, reviews and utilities. Technology never stops and neither should your education. Come to *the* premier information source for the Color Computer, THE RAINBOW, and be in the know.

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August 1986 Vol. VI No. 1

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LETTERS TO THE RAINBOW

Software Thieves (Not Pirates)!

Editor:

This letter is to all the software thieves who are passing around a broken version of *CBASIC V1.01*. It was discovered some time ago that this version of *CBASIC* was available on BBSs around the country. When I downloaded a copy, I was quite upset. I spent over two years writing this program only to find some thieves had stolen it and were freely giving away copies. What gives you the right to take two years of my work and give it away or use it without my consent? Not only have you taken something that does not belong to you, you have also given *CBASIC* a bad name. The copies you are giving away are not even near the current version (V1.12) that has a large number of additional commands, functions and improvements. Not only that, but the stolen version has many commands and features that no longer work after it was broken.

Some of you even have the nerve to demonstrate it at computer club meetings and discourage people who are considering purchasing *CBASIC*. Then there are those who have acquired the stolen version and have the nerve to call us up and ask us why something doesn't work.

Through greed or the desire to be the center of attraction in the local CoCo Community, you have succeeded in killing the best Color BASIC compiler on the market. You have also succeeded in cutting our sales of *CBASIC* by over 50 percent. We can no longer afford to run our current advertisement since we no longer sell enough copies to pay for it. I have to wonder, is it worth it to continue to improve and enhance *CBASIC* if I can't afford to pay for the advertising? It also makes me realize that it is not worth the time or effort to even attempt to work on another program as complete or complex as *CBASIC* for the Color Computer.

Bill Vergona
Cer-Comp
Las Vegas, NV

BACK TALK

Editor:

May I offer some suggestions in response to Kyle Johnson's query in the June 1986 issue [Page 8] regarding genealogy programs for a 64K Color Computer 2.

Prickly-Pear regularly advertises a *Family-Tree* program in RAINBOW magazine. Another tape program I have found to be much more complete and usable on disk is *Lineages*, prepared and sold by Ervin A. Madera, P.O. Box 1746, Rohnert Park, CA 94928-1241 for $35.

Allen R. Streeter
Saginaw, MI

Incorporating Print Styles

Editor:

In response to the question from Jerry Dummer in the June 1986 issue [Page 9], he asked how to incorporate various styles of print (which his printer will print) within *Color Scripsit*. I substitute the codes for whatever character font I want to print in place of the codes Underline and Elongate in Option 7 on the main menu.

I hope this will be of help; your magazine has certainly been a great help to me.

Lloyd O. Billings
Seattle, WA

VIP Defended

Editor:

I take respectful difference with Richard White for his statement in your May 1986 issue that *VIP Writer* might qualify as user hostile compared with other offerings. *VIP* is a powerful, elegantly programmed, and very intuitive and logical word processing package, with programmed-in and programmable printer controls that are beyond belief. The kingdom of MS-DOS should have a package as powerful and practical! Neither *WordStar* or *PC WRITE* can touch *VIP* for convenience and transparency.

I am a registered owner of *Telewriter-64* as well as *VIP*, and I have a lot of respect for it. I don't doubt that you're right, Dan (May 1986, Page 217): *Telewriter-64* is probably the most widely used word processor for the CoCo; it's a fine package and it's been around a long time. But for my big writing projects I invariably reach for *VIP*. The recent patches for *Telewriter-64* have added a lot to the original, but they give it features that *VIP* has as standard equipment.

A *VIP* users' group was recently formed. Interested persons can write me at Box 194, 01463. Hints, brief articles, letters, *VIP* database formats and CALC templates are gratefully received. There are no set dues, but contributions to defray the cost of copying and mailing the quarterly newsletter are most welcome.

John Ogasapian
Pepperell, MA

Transformation Troubles

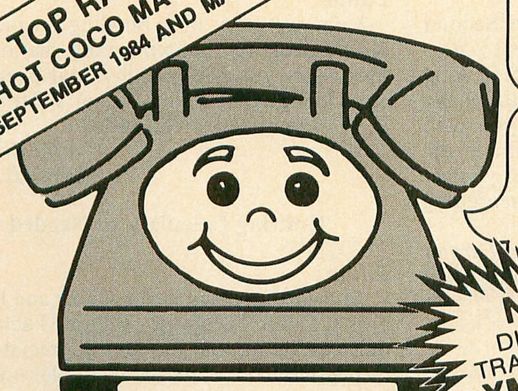
Editor:

In the June 1986 issue, Marty Goodman's article, "The Great Transformation" [Page 182] and associated programs are very good and fill a substantial need. It is indicative of the quality software available in THE RAINBOW.

One problem is the interface between *VIP Writer* and several MS-DOS word processors. *Display Writer 3* and *WordStar* are two MS-DOS word processors I have used and both insert a carriage return at the end of every line. On the other hand, *VIP Writer* inserts a carriage return only at the end of a paragraph (a forced line feed). Thus an ASCII file from *Display Writer 3* or *Word Star* used with *VIP Writer* produces a double-spaced output.

The problem becomes more serious when sending ASCII files from *VIP Writer* to *Display Writer 3* or *Word Star*. The MS-DOS software expects a carriage return after every line and without them treats the entire paragraph as one long sentence. It seems that these problems are eliminated if

TOP RATINGS
HOT COCO MAGAZINE
SEPTEMBER 1984 AND MAY 1985



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Parker, *HOT CoCo*, 5/85

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Please hire the mentally retarded. They are sincere, hard working and appreciative. *Thanks!* *Phyllis.*

Telewriter-64 is used since it inserts carriage returns at the end of each line.

If anyone has a simple solution to this problem, I'm sure it would be appreciated by the many *VIP Writer* users.

Ronald Pettus
St. Charles, MO

Assessing the Assessment

Editor:

I must take exception to the article by Harry Hallstrom entitled "Assessing the Market Value of Your Home," April 1986 [Page 79]. While Mr. Hallstrom's program seems well-written and well-intentioned, it *does not* assess the fair market value. I can understand his bewilderment after talking with three real estate agents who were obviously lacking in training. Without facts to back up their "market value," it is no wonder they came up with a $20,000 range.

On the other hand, Mr. Hallstrom's method neglects changes in the buying market, availability and type of financing, changes in the neighborhood, conformity within the neighborhood, condition, area amenities and more. In addition, improvements rarely increase the value as much as they cost.

Your readers would be best advised to base their asking price on information from comparable sales and competitive properties. If you live in a small town with no multiple listing service and only local real estate companies, go ahead and order a FNMA appraisal. The cost of the appraisal is small when compared to the frustration of an extended marketing time and false expectations.

Roger A. Knauff
Montgomery, AL

HINTS AND TIPS

Editor:

Users of "Name That Tune" (June 1986, Page 66) will experience problems with the firebuttons regardless of the computer they use. `PEEK(65280)` gives a number in the 100s or 200s depending on `JOYSTK(0)`. To correct this problem, make the following changes in the program:

```
5100 P=PEEK(65280) AND 3
```

In lines 5110, 5120 and 5135, substitute 2 for 254 and 1 for 253.

Bruce Lewis
Maryville, MO

The substitution will work — and it will work on both CoCos regardless of what set of numbers your firebuttons produce. However, it also involves one more function to be performed (computing the logical AND on P) in a spot where there is really no time to spare. Hence, the joysticks become a little less sensitive and the music moves a little slower.

Marge Rutter
Program Author

Ring Quest Reincarnation

Editor:

I enjoy your magazine and the Second Adventures tape and would like to pass along a hint for the Adventures tape. In *Ring Quest*, to make it so you cannot die, make `340 GOTO 354`. This reincarnates you with a loss of hit points totaling the number the monster killed you with, but at least you get to finish the game. This is great for searching rooms.

Mike Farmer
Ellensburg, WA

REQUEST HOTLINE

Editor:

I own a grain crop farming operation and would like to know what companies have farming business software available for the CoCo. Write me at RR 1, Box 301A, 46176.

Scott Newkirk
Shelbyville, IN

And the Beat Goes On

Editor:

I am looking for a program to allow the CoCo to perform as a metronome. I run a recording studio in Nashville and would like to use it for my studio work. Can anyone help me? My address is 300 Rural Hill Ct., 37217.

Michael Bridges
Nashville, TN

Mailing List Merger

Editor:

Is there any way to merge a mailing list created by a BASIC program to *Telewriter-64*? My address is 133-01 Sanford Avenue, 11355.

Tho Luong
Flushing, NY

Data Sheet Dearth

Editor:

I would like to know if anyone knows where I can obtain the 1793 FDC data sheet (Floppy Disk Controller) by Western Digital Corporation. I need an address and telephone number please. Write to me at 834 Third Street, G8P 1P6.

Claude Gosselin
Chibougamau, Quebec

Domestic Requests

Editor:

Kudos to Scott Halfman for his *Castle of Doom* program (June 1986 issue, Page 26). This is by far one of the best BASIC game programs for the CoCo I have ever seen.

I need help finding a couple of programs. First, I am looking for a program to help my wife lay out cross stitch patterns on all sizes of material. Second, I am looking for a program that will teach shorthand. Any help would be appreciated. I can be reached at RR 2, Box 85-A, 47882.

Scott Lampton
Sullivan, IN

Brother, Can You Spare a Program?

Editor:

I am secretary of a bowling league and need a program that will enable me to keep up-to-date records of individual averages, etc. Does anyone know of one? Write to me at 195 Lynnfield Street, 01960.

John C. Groz
Peabody, MA

Knitting Calculations Needed

Editor:

My wife has a knitting machine and I have a 64K Color Computer, Radio Shack disk drive and a printer. I would appreciate any information on programs available concerning knitting machine calculations. Any information can be sent to me at 2341 Floyd Drive, 53404.

James E. Johnson
Racine, WI

See the Sugar Software ad on Page 80 in the May 1986 issue. They have a program called CoCo Knitter. *It was also reviewed in the same issue (Page 195).*

Diet Diagnostic

Editor:

Do you know of a nutrition and disease program for the Color Computer 64K for use with organic diseases, diet, vitamins, symptoms, dates, hours, etc. My address is 4617 Girard Avenue No., 55412.

Wilma Bisted
Minneapolis, MN

The October 1985 issue, Page 213, has a review of a program by Homesoft called Nutriguide. *This may be what you are looking for.*

Rabbit Relations

Editor:

I was recently approached by several friends who are involved with rabbit breeding. We are looking for a program to compile information on rabbits for ease of record-keeping. It would be similar to a genealogy program. Has anyone seen or heard of such a program? I would appreciate hearing from anyone on this subject. I can be reached at P.O. Box 775, 70664-0775.

Morgan J. Maynard
Sulphur, LA

DELPHI LINE

Editor:

OS-9, to me, means incompatability with all of my files that are in Extended Disk BASIC format. What would I need OS-9 for? Everything I ever use is in the normal format. Why are there only hard drive drivers for OS-9? It would be a great idea to use a hard drive in place of a floppy! Then I would have faster data I/O and lots more space.

I could put *CoCo Max II* and *VIP Writer* on it, etc. I know this would be possible if I could get a software driver that would drive a hard drive from Disk BASIC just like a floppy but with the plusses of a hard drive. More people would use hard drives because they wouldn't have to learn another operating system and wouldn't have incompatability with their existing programs. Does anyone know where I can get a hard drive driver for Extended Disk BASIC? If so, please write to me at 125 Kelmar Avenue, 19355.

Ted Matthews
Frazer, PA

You might check our advertisers such as Owl-Ware.

INFORMATION PLEASE

Editor:

Does anyone have a device driver and a device descriptor for using the Radio Shack X-pad under OS-9, or a program to use and define the four special function keys on most CoCo replacement keyboards for use under OS-9, or an OS-9 sound program, or an OS-9 key click program? My address is P.O. Box 506, 83221.

Robert Parsons
Blackfoot, ID

Game Quest

Editor:

I am looking for a jet combat simulator for the TRS-80. There are two available for the Commodore 64 right now.

Also, I would like to know where I could get the game *P-51*. My address is 3447 Dempsey Road, 43081.

Kevin Burton
Westerville, OH

You can purchase the game from Tom Mix Software.

In Search of Rainboard

Editor:

Can you please tell me in which issues of RAINBOW the "Rainboard BBS" appeared. I also want to thank all the people who make THE RAINBOW what it is.

Nick Barnes
Waterbury, CT

"Rainboard" by Lane Lester appeared on Page 44 of the November 1984 issue. Also see "Supreme SysOp and Magnificent Modem Master" on Page 20 of the November 1983 issue.

Speechless

Editor:

I have purchased the *Super Voice Cartridge* along with the *Translator* from Speech Systems. After reading instructions and running sample programs it works fine, but when I try it with other programs that ask if I have a speech cartridge and I say yes, it doesn't work. I have tried it with several Radio Shack programs and on *Gold Runner* from Tom Mix and it won't work with any of these programs. I would like to know if there is a program or a way to get the *Super Voice Cartridge* to work with these programs. If anyone can help, please write me at P.O. Box 8522 LRS, 77711.

Thank you for Delphi, it is:

D elightful
E ntertaining
L ovable
P owerful
H elpful
I nspiring

Gene Darby
Lumberton, TX

The other programs you are using are designed for the Radio Shack Speech/Sound Cartridge.

CoCo Confusion

Editor:

I have a 64K CoCo. I received my May 1986 RAINBOW and looked through it. In the "Received & Certified" column I saw the Infocom games. I noticed it said the games were for the CoCo 2. I know that the CoCo 2's POKE locations are different. Can I use it on my CoCo? If not, are they going to come out with one for the CoCo 1?

Ryan Smith
Placerville, CA

The Infocom routines require the DOS command to boot. They have, however, loaded on our older CoCos when we used the OS-9 boot routine to run them.

Take It All Off?

Editor:

Is it OK to turn off all the computer equipment at the power strip, or should I continue to turn off everything individually?

RAINBOWfest at Palo Alto was great. Not only were there great bargains at the booths, the seminars we attended were good — especially the Steve Bjork seminar. We also attended Dale Puckett's OS-9 seminar and bought his book. Keep up the good work, and please come back out our way soon.

Sonya J. Hurst
Richmond, CA

Although it is not recommended by Radio Shack, it has worked without detriment to the equipment.

Documentation Dilemma

Editor:

I recently purchased a Centronics Model 308 printer for $50. I knew it was used when I got it and expected it would not be in good shape, but I was wrong. The problem is I have no documentation on it. If anyone has documentation please send me a copy of it or tell me where I could get it. My address is P.O. Box 56, 67103.

Brian Daily
Mayfield, KS

Packet BBS

Editor:

Have any radio amateurs found or constructed a packet bulletin board program or message recorder/transmittal program for the CoCo in conjunction with two-meter packet radio? I have experimented with the *Autoterm* program (building keystroke multipliers section), but the AEA PK=80 packet controller will not access these commands when a station calls my station. Any suggestions would be appreciated. My address is 19 New York Avenue, 08735.

Harry Warren W2SAD
Lavallette, NJ

BOUQUETS

Editor:

I was pleasantly surprised to receive a software update disk from one of your advertisers, Micro Works. I had purchased the DS69A Digitizer and C-See software, and had found it to be a good product. Apparently Micro Works found a bug, and without any complaint from me, sent a new version of their software. Your readers should know that they are concerned for their customers.

Terry A. Jackson
Lombard, IL

Editor:

I would like to publicly thank the people at Frank Hogg Laboratory for the courteous and prompt service I received. I recently ordered some merchandise and am very pleased. The person who took my order explained what each piece would need to work properly on my system and answered all my questions. Half of the order arrived in two days. One piece had to be back ordered and it came in just four days. All of this, plus fair prices, make FHL a company for the CoCo Community.

Jim Martin
Indianapolis, IN

Editor:

I enjoy getting THE RAINBOW and the main reason is because of your great range of advertisements and great departments, like "CoCo Gallery." It was in THE RAINBOW that I came across Dayton Associates; they have given me good, fast service and I haven't had a problem yet.

Mike Jovanovic
Chicago, IL

Editor:

I would like to thank Bob Rosen of Spectrum Projects for his assistance in getting my Mark Data Products Universal Video Driver to work. I contacted Bob Rosen and explained my problem. He immediately resolved it.

Bill Stephan
Massapequa, NY

KUDOS

Editor:

I feel highly honored to have a piece of

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This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

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my work published in "CoCo Gallery." I consider THE RAINBOW to be the finest computer magazine published today. Your interesting and intelligently edited magazine has had a lot to do with the success of our beloved CoCo.

Merwyn Bly
Vienna, VA

Missing Address

Editor:

A gentleman phoned me with a question about my *IRA Estimator* (April 1986, Page 70). I promised to send him a cassette to compare with his typed-in listing, but I lost his name and address. He is from either Maryland or Virginia. Please send me your address again. Your tape is ready.

Bruce W. Ronald
Dayton, OH

How about a 'Wishing Well'

Editor:

I would like to see in RAINBOW a section entitled "Programs I Wish Somebody Would Write." Readers could write in about a program of their particular interest that might be of interest to many others with the same need. I personally have use for more business and science software rather than games. It would be great if someone could write a program for CoCo on linear programming or a graphics break-even analysis program. I would purchase these kinds of programs, but nowhere are they written for the Color Computer.

Ron F. Pfeiffer
Cuyahoga Falls, OH

Where have you been? Fred B. Scerbo, a contributing editor, has been writing the "Wishing Well" column since March 1984. He is receptive to all readers' requests and ideas — you should drop him a line.

BULLETIN BOARD SYSTEMS

Editor:

The Pub BBS of Chandler has moved to Mesa and has a new telephone number: (602) 844-7840. The system is running 24 hours a day under OS-9 with PBBS 4.0 software using a 64K CoCo with multipack, 80-column card, hardware clock and three 80-track, double-sided drives. We support 300 and 1200 Baud. No password is required. There are six download subdirectories for text, OS-9, Model 100, CoCo and graphics. The Pub has been running for nearly two years. Please stop by and see us sometime.

Steve Roberson
Mesa, AZ

- I would like to announce the new L.A. Color Users Board BBS system. It is running the Colorama software at 300 Baud and has five download sections, magazine, gallery, message base and much more. We are up 24 hours a day. The number is (213) 773-3024. To be guaranteed full access after the first call, send a post card to 4740 E. Florence, #1, 90201.

Bill Gordon
Bell, CA

- I am pleased to announce that the Star Trek BBS is online 24 hours a day, seven days a week. This system runs on a CoCo 2 with two DSDD (disk) drives. The board has online games, downloading (XMODEM), chat with Capt. Kirk and more. Phone (203) 822-8176.

Bruce Bouley
Norwick, CT

- I have a 64K CoCo 2 with one disk drive, printer and 300 Baud modem. My number is (315) 549-2501 or if anyone knows of a BBS in my area please call or write. My address is 5418 Rt. 89, 14541.

Drew Hammond
Romulus, NY

- For the benefit of the CoCo Community, I have listed some local BBSs in the Yonkers and Bronxville area that support the Color Computer:

Westchester #1, 300-1200 Baud, 24 hours a day, seven days a week, TBBS system. Phone (914) 965-2355, Bill Graspo, SysOp.

Lexicon BBS (formerly WCHR BBS), 300-2400 Baud, 24 hours a day, seven days a week, TBBS system. Phone (914) 776-2424.

System 80, 300-1200 Baud, 24 hours a day, seven days a week. Phone (914) 793-5408, Steve Brundale, SysOp.

Capraselli, 300-1200 Baud, 24 hours a day, seven days a week, TBBS system. Phone (914) 699-8186.

M&M Public BBS, 300-1200 Baud, 24 hours a day, seven days a week, TBBS system. Phone (914) 738-6857.

TBBS of Yonkers (formerly the Undersea Kingdom of Golden Bridges), 300-1200 Baud, 24 hours a day, seven days a week, TBBS system. Phone (914) 964-8845, Mike Sebar, SysOp.

I hope this encourages more CoCo nuts to participate in the growing world of telecommunications!

S.A. Borbas
Yonkers, NY

- The Peninsula CoCo Board, which has been online since May 1984, now supports up/downloads, mail section, public messages, a D&D section, private messages and SIGs for Commodore, Atari, CoCo, Apple and MS-DOS machines. The BBS is operated on a 64K CoCo with 1.8 megs of online storage program in CoBBS and supports 300 or 1200 Baud. Parameters are 8, 1 & N only. Phone (804) 868-0922. Passwords are usually approved within 24 hours. Security is strict and only public domain programs are allowed. Runs 24 hours daily, seven days a week, except when SysOp is playing.

Bill Satterwhite
Tabb, VA

- I would like to announce the formation of CoCo Beach. It runs on a Colorama BBS system with multilevel access, online games and more. Call (206) 432-2512. Jeff Gill, SysOp.

Brian Wright
Seattle, WA

LATE NIGHT RATES ON DELPHI

If all goes as planned, by the time you read this, Delphi will have instituted summer Late Night Rates!

The way it works is that, during the late night/early morning hours, users will receive one free minute for every 10 minutes used, amounting to a 10% discount.

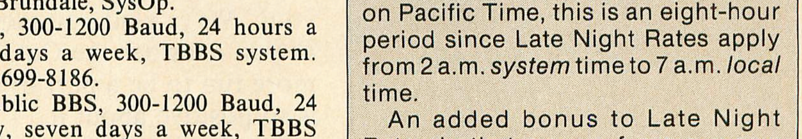
The Late Night Rates are to be in effect during July and August and apply to connect time between 2 a.m. system time (Eastern Daylight Time) and 7 a.m. local node time (the time at your end). For Eastern U.S. users this is a five-hour period, but for those on Pacific Time, this is an eight-hour period since Late Night Rates apply from 2 a.m. *system* time to 7 a.m. *local* time.

An added bonus to Late Night Rates is that many of THE RAINBOW authors and editors choose to be on our CoCo SIG during this period anyway!

THE RAINBOW welcomes letters to the editors. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or space.

Letters to the editors may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

ARTS AND LETTERS


FROM THE HURST ZOO TO YOU.....

Sonya and Ken Hurst
Richmond, CA

A Down Home Invitation

Our Anniversary Issue is history now and we've already received more notes, letters and cards about it than anything we've done in a long time. As things work through the editorial department, we'll print a representative number of your comments in our letters column.

Just about everyone had nice things to say, and all I can say is "thank you!" We're glad you consider THE RAINBOW to be "your" magazine just as you consider the CoCo to be "your" computer. It makes it a whole lot more fun to be a part of the CoCo Community when you know everyone is so positive about it.

Maybe the special section on the people who do THE RAINBOW whetted a few appetites, or maybe it is just because summer is coming and it's time to "hit the road" for vacation. Whatever the reason, we're getting a whole lot of requests for tours of the Falsoft Building for this summer.

If you've already written to us about that, you know who to contact. But if you happen to be near Prospect and would like to stop by, you can arrange for a tour by writing or calling Ira Barsky, who is in charge of our development program. Call or write Ira at our regular address and, if at all possible, we'll be happy to have you. I'm sorry, but we can only do this Monday through Friday during regular office hours (9 a.m. - 5 p.m.).

* * *

Speaking of Ira, our newest employee, reminds me to talk about RAINBOWfest, which is also under his aegis.

The Chicago show this year was a resounding success, but proved to me that I should let well enough alone.

One of the biggest complaints we've always heard about RAINBOWfest is that the aisles are too small and there is not enough room to walk around easily. In Chicago this year we took some extra space to make the aisles wider. And what happened? The main response I got was that "the show seems smaller than last year."

Actually, the Chicago RAINBOWfest had a slight increase in attendance from last year (and were there some bargains to be had!), but it *did* seem smaller because there was so much extra room.

Don't expect that to happen again. After telling several hundred people that the show was running the same, attendance-wise, I decided that we'll forgo the bigger aisles from now on.

> ***"We're glad you consider THE RAINBOW to be 'your' magazine just as you consider the CoCo to be 'your' computer. It makes it a whole lot more fun to be a part of the CoCo Community when you know everyone is so positive about it."***

And, we anticipate there will be another major change for RAINBOWfest next year — two shows rather than three. We will be in Princeton, New Jersey, and Chicago, but the future of the California show, right now, is in doubt.

The California show has always been our smallest — at least 2,000 less than the other two — and has always been the most expensive to produce. Part of that is because of the great distance we have to travel, but the other aspect is that hotels in the California area (northern *and* southern) charge far more for use of their facilities than anywhere else in the country.

We have not made a final decision yet and hate not to go to the West Coast, but we believe we might be forced into dropping this one show because of a combination of cost and attendance.

We are trying to find a way to cut costs and boost attendance in California but we are not sure if those efforts will be successful. If not, be certain that the shows in Princeton and Chicago will be held as planned.

* * *

My August column is traditionally a pretty short one — I usually get "written out" for the July anniversary issue. But I did want to keep you up to date on what's going on here and will close by saying I hope we'll see you in Prospect this summer!

— Lonnie Falk

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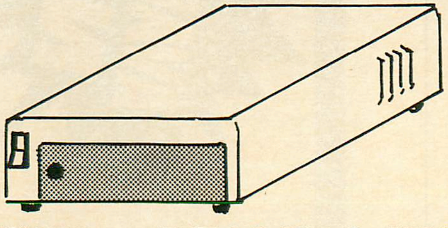

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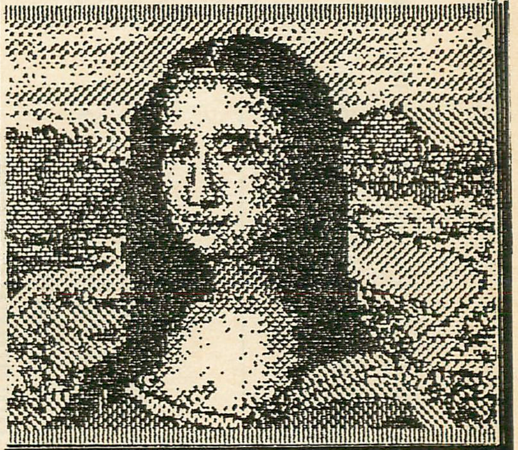

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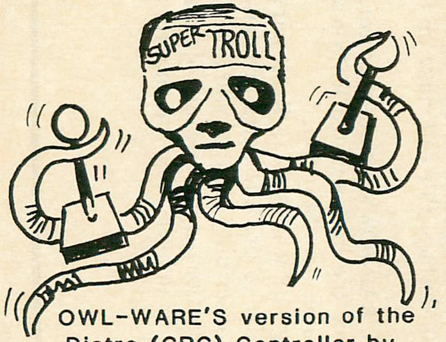

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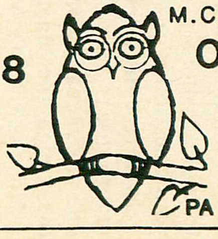

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BUILDING AUGUST'S RAINBOW

That plastic look . . .
A doctor in the house . . .
And, assorted CoCo commentary

A grab bag of sorts. Yes, the cover of last month's anniversary issue "feels funny," or, as one reader says, "appears to be waterproof." Well, it was *laminated*; that is, a "photopolymer," a thin plastic coating that dries upon exposure to ultraviolet light, was added to give it a spiffier look. We figured, with our mugs on the cover, we could use all the help we could get.

Perhaps "water resistant" would be more appropriate than "waterproof," to borrow terms more associated with watches and raincoats than magazines. Laminating a cover is much like waxing your car: it brings out the color to make it look prettier and it helps protect the surface, too. For instance, if you use a Magic Marker to draw mustaches on our caricatures, you can wipe them right off again. At any rate, the lamination process was an extra feature of our anniversary issue and, because it is quite expensive, it'll likely be a while before we do it again. We hope you liked it.

Something brand new this month is "CoCo Consultations," a technical Q&A column by Martin H. Goodman, M.D. Marty is a hard-core hacker if ever there was one and, I believe, his knowledge of the CoCo and its associated hardware and software is unexcelled. Our challenge here at THE RAINBOW will be to keep Marty's voluminous replies in "CoCo Consultations" from spilling over into the next dozen pages.

An added extra for RAINBOW readers is that Marty can be reached almost every evening on our CoCo SIG on Delphi. Thus, you can receive quick replies to your questions, even though, due to our "lead time," it may be months before your question is published in his (or Dan Downard's) column.

I was recently treated to several hundred words of "clarification" from Marty in response to a few dozen words in a letter to the editor in July's issue. It appears one of our readers was somewhat overzealous in his comparison of the CoCo, the Amiga, the Macintosh and the Atari 520ST.

No, the CoCo's Motorola MC6809E, most certainly, *is not* a 16-bit CPU, as was claimed, but rather an eight-bit device, albeit with 16-bit internal registers. Secondly, while 512K add-ons are available for the CoCo, only 64K is directly addressable. There were some other inaccuracies, too, but, for Marty's full response, you'll need to check our CoCo SIG database.

Professor Art Flexser was one of the first to chide us for not contesting the letter when we ran it, an editorial oversight. We've also received letters from several others, including George Henry of Glendale Heights, Illinois; Lake Smith of Mt. Juliet, Tennessee; Troy Rothwell of Battle Creek, Michigan; and Alan Blount of Grand Junction, Colorado. The sum and crux of everyone's remarks is that, yes, the CoCo is a wonderful machine, but let's keep the facts straight.

Toward that end, we asked Bill Barden to do a piece on "How Does the CoCo Stack Up?" Bill is a recognized authority on personal computers and his commentary begins on Page 90. Perhaps this will make up for letting that July letter slip through.

And, what else is new? Well, RAINBOW's technical editor, Dan Downard, is about ready for us to introduce the long-awaited RAINBOW ON DISK service, which will include OS-9 programs, too. Stay tuned.

Lastly, we'll soon be mailing THE RAINBOW in Kraft paper — the infamous plain brown wrapper — in order to provide extra protection during mailing. So, if you've been putting off subscribing because you don't like the label being stuck on the cover, now's your chance to join the ranks of those who save money, and time, by signing up for home delivery. For this month, that's "a wrap" for me, too.

— Jim Reed

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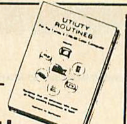

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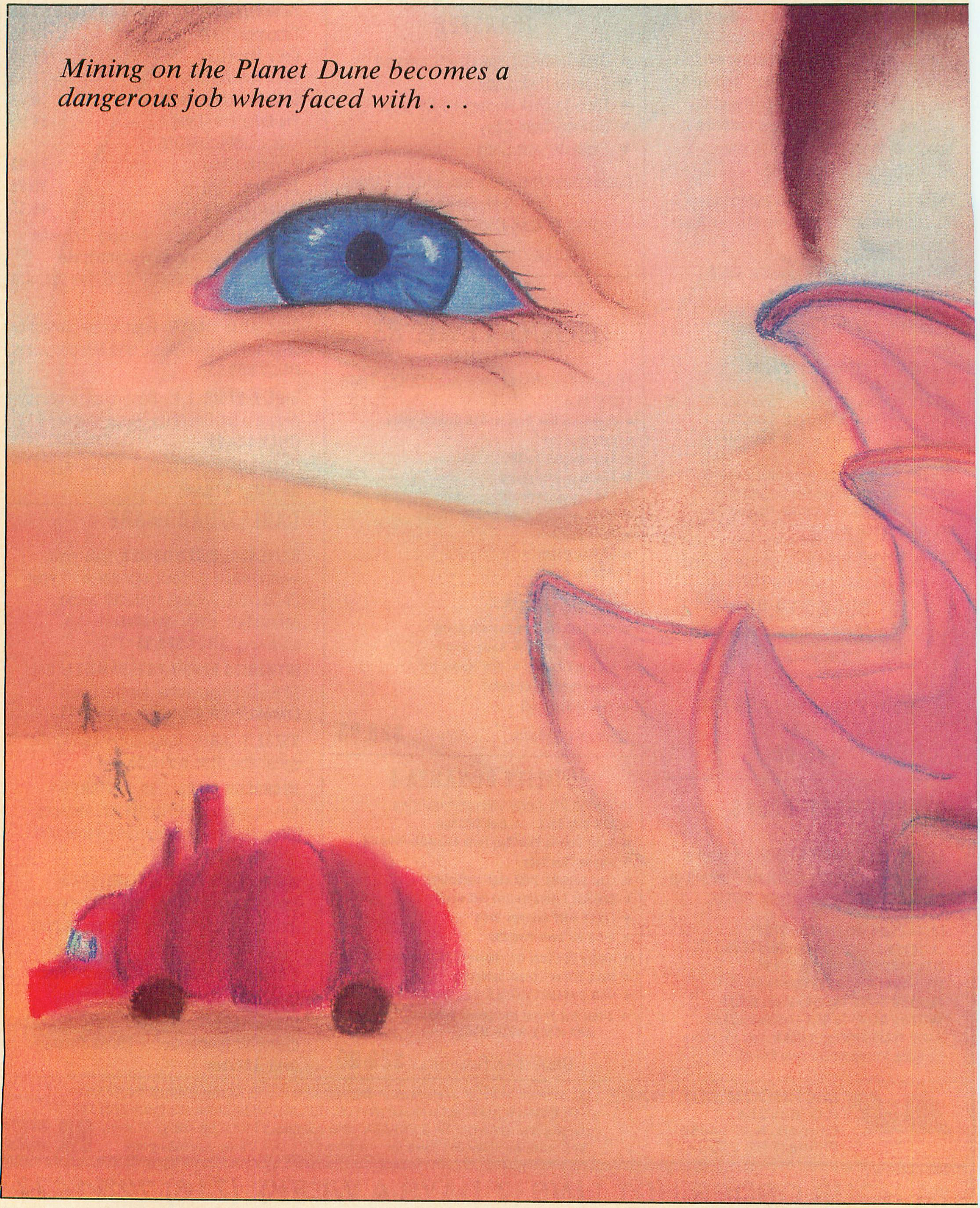
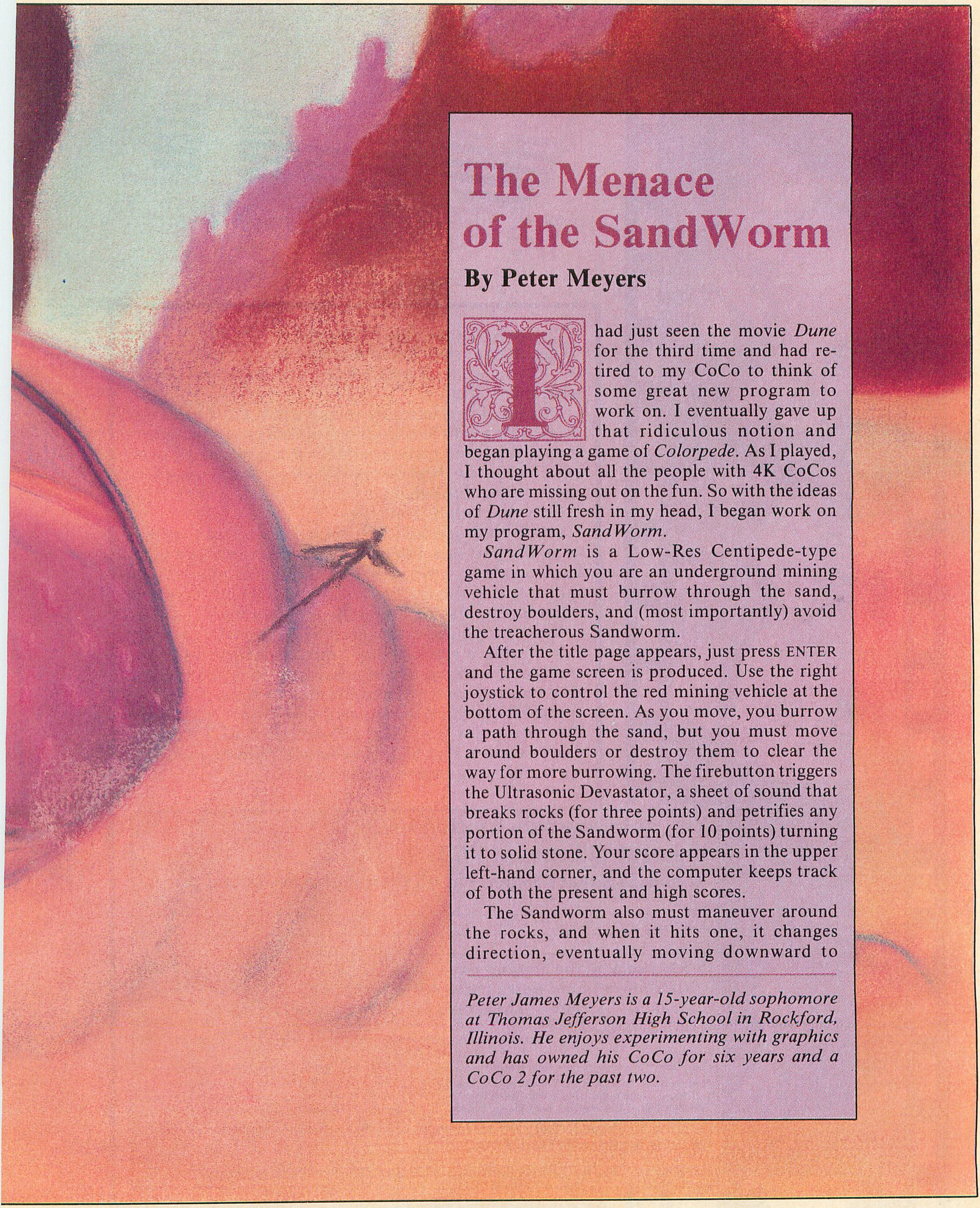




The Menace of the SandWorm

By Peter Meyers

I had just seen the movie *Dune* for the third time and had retired to my CoCo to think of some great new program to work on. I eventually gave up that ridiculous notion and began playing a game of *Colorpede*. As I played, I thought about all the people with 4K CoCos who are missing out on the fun. So with the ideas of *Dune* still fresh in my head, I began work on my program, *SandWorm*.

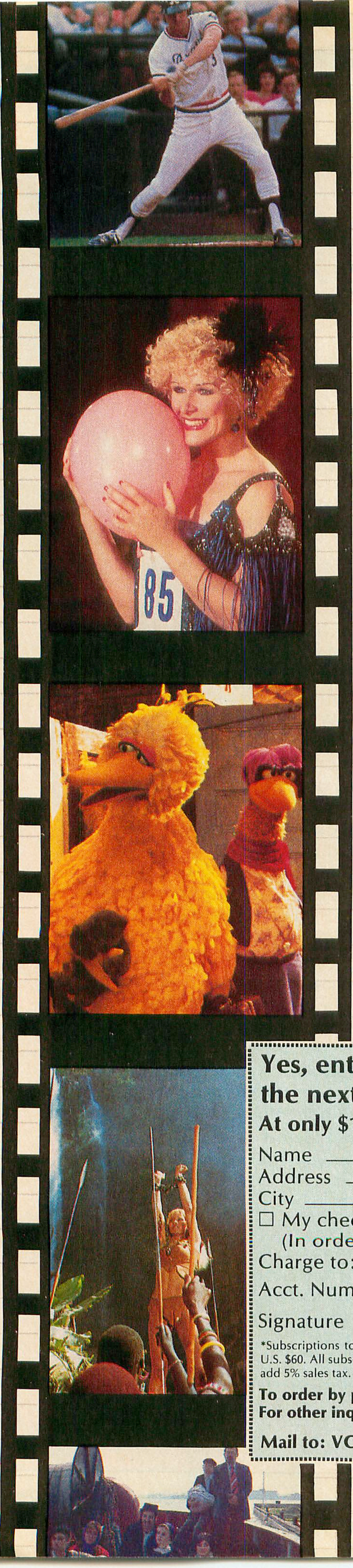
SandWorm is a Low-Res Centipede-type game in which you are an underground mining vehicle that must burrow through the sand, destroy boulders, and (most importantly) avoid the treacherous Sandworm.

After the title page appears, just press ENTER and the game screen is produced. Use the right joystick to control the red mining vehicle at the bottom of the screen. As you move, you burrow a path through the sand, but you must move around boulders or destroy them to clear the way for more burrowing. The firebutton triggers the Ultrasonic Devastator, a sheet of sound that breaks rocks (for three points) and petrifies any portion of the Sandworm (for 10 points) turning it to solid stone. Your score appears in the upper left-hand corner, and the computer keeps track of both the present and high scores.

The Sandworm also must maneuver around the rocks, and when it hits one, it changes direction, eventually moving downward to

---

Peter James Meyers is a 15-year-old sophomore at Thomas Jefferson High School in Rockford, Illinois. He enjoys experimenting with graphics and has owned his CoCo for six years and a CoCo 2 for the past two.



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destroy your miner. If any part of the worm collides with you, you are instantly smashed to pieces. The worm also possesses a natural burrowing beam that breaks up rocks as well as destroys you. When you are destroyed, the worm restarts at the upper left-hand corner of the screen, a few more rocks are added to the screen and you continue until all three of your miners are destroyed.

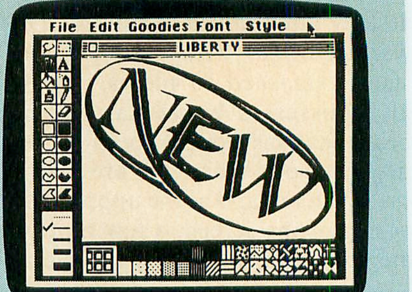
When the game ends, the high score is displayed and you are asked if you want to play again. As long as you do not end the program, the high score remains updated throughout the games.

The best thing about *SandWorm* is it only uses 2.083K of memory and will run on the smallest of CoCos. I have not included the famous speedup `POKE` because my system will not accept it, but those who want to should add it to give more excitement to the game. The game itself is pretty self-explanatory and you should have no trouble mining the rich soil of the desert planet with a little practice (and a lot of luck). ☐

The listing: `SANDWORM`

```
10 CLEAR10:CLS0:PRINT@107," SAND
WORM ";:PRINT@164," BY: PETER ME
YERS, 1985 ";:PRINT@230," FOR TH
E TRS-80 COCO ";:PRINT@420," PRE
SS <ANY KEY> TO PLAY ";
20 A$=INKEY$:IFA$=""THEN20
30 LC=7:LV=3:B=0:S=0
40 CLS3:FORX=1TO60:PRINT@RND(447
),"o";:NEXT:FORX=6TO13:CP(X-5)=X
:DM(X-5)=1:NEXTX
50 PRINT@1,STR$(S)+" ";:H=JOYSTK
(0):V=JOYSTK(1)
60 A=A+1:IFA=1THENSC=464
70 PRINT@SC,CHR$(128);
80 IFH>45THENSC=SC+1 ELSEIFH<15T
HENSC=SC-1
90 IFV>45THENSC=SC+32 ELSEIFV<15
THENSC=SC-32
100 IFSC>511THENSC=SC-32 ELSEIFS
C<354 THENSC=SC+32
110 IFSC>510THENSC=SC-1 ELSEIFSC
<352THENSC=SC+1
120 IF PEEK(SC+1024)=15 THENMU=1
130 IFMU=1ANDH>45THENSC=SC-1 ELS
EIFMU=1ANDH<15THENSC=SC+1
140 IFMU=1ANDV>45THENSC=SC-32 EL
SEIFMU=1ANDV<15THENSC=SC+32
150 MU=0
160 PRINT@SC,CHR$(183);
170 P=PEEK(65280):IFP=126ORP=254
THENGOSUB330
180 B=B+1:IFB>1THENNEXTX
190 FORX=LC TO1 STEP-1
200 PRINT@CP(X),CHR$(128);
210 CP(X)=CP(X)+DM(X)
220 IF(CP(X)+1)/32=INT((CP(X)+1)
/32) THENCP(X)=CP(X)+32:DM(X)=-1
230 IFCP(X)/32=INT(CP(X)/32) THE
NCP(X)=CP(X)+32:DM(X)=1
240 IFPEEK(CP(X)+1024)=15 THENCM
=1
250 IFCM=1 ANDDM(X)=1 OR CM=1 AN
DDM(X)=-1 THENDM(X)=32:CP(X)=CP(
X)+31:CM=0
260 IFCM=1 ANDDM(X)=32 THEN DM(X
)=1:CP(X)=CP(X)-31
270 IF CP(X)>448 THENTB=TB+1:IFT
B=1 THENDM(X)=-1
280 IFCP(X)>510 THENCP(X)=CP(X)-
64:DM(X)=-1
290 IF PEEK(CP(X)+1024)=183 THEN
GOSUB450
300 PRINT@CP(X),CHR$(153);:CM=0
310 CL=RND(3):IFCL=1THEN390
320 GOTO50
330 SOUND255,1:FORLP=SC-32 TO1ST
EP-32
340 IFPEEK(LP+1024)=15 THENS=S+3
:PRINT@LP,CHR$(175);:SOUND100,1:
RETURN
350 IFPEEK(LP+1024)=153 THENS=S+
10:PRINT@CP(LC),"o";:LC=LC-1:IFL
C=0THENFORX=6TO13:CP(X-5)=X:DM(X
-5)=1:NEXTX:LC=7:X=7:TB=0:SOUND1
,2:SOUND8,1:RETURN:ELSESOUND1,2:
SOUND8,1:RETURN
360 PRINT@LP,CHR$(207);:PRINT@LP
,CHR$(128);:PRINT@LP,CHR$(175);
370 NEXTLP
380 RETURN
390 IFCP(LC)>478 THEN50ELSEFORPL
=CP(LC)+32TO510STEP32
400 IFPEEK(PL+1024)=15 THENSOUND
200,1:GOTO430
410 IFPEEK(PL+1024)=183 THENDS=1
:GOTO440
420 PRINT@PL,CHR$(170);:NEXTPL:S
OUND200,1
430 IFPL>510 THENPL=510
440 FOREL=CP(LC)+32TOPL STEP32:P
RINT@EL,CHR$(175);:NEXTEL:IFDS=1
 THENDS=0:GOSUB450:GOTO50 ELSEGO
TO50
450 LV=LV-1:IFLV=0THEN460ELSEFOR
Y=6TO13:PRINT@CP(Y-5),CHR$(175);
:CP(Y-5)=Y:DM(Y-5)=1:NEXTY:TB=0:
SOUND20,7:SOUND1,9:FORMM=1TO20:P
RINT@RND(479),"o";:NEXTMM:RETURN
460 IFS>HS THENHS=S
470 PRINT@1,STR$(S)+" ";:PRINT@7
1," HIGH SCORE:"HS" ";:PRINT@234
," GAME OVER ";:PRINT@421," ANOT
HER GAME ? (Y/N) ";
480 A$=INKEY$:IFA$=""THEN480 ELS
EIFA$="Y"THENGOTO30 ELSEEND
```

CoCo Max™ II



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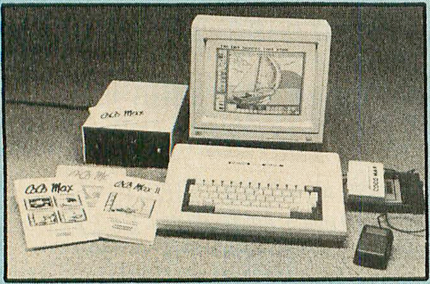
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Is CoCo Max for you ?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

What made CoCo Max an instant success ?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply ***pointing*** and ***clicking*** with your mouse or joystick. With ***icons*** and ***pull down menus,*** you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The ***undo*** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

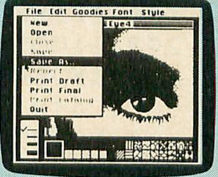
With the ***pencil*** you can draw free hand lines, then use the ***eraser*** to make corrections or changes. For straight lines, the convenient ***rubber-banding*** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The ***paint brush,*** with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple.

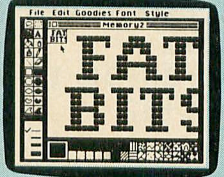
For special effects, the ***spray can*** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The ***Glyphics*** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in !

Control Over Your Work

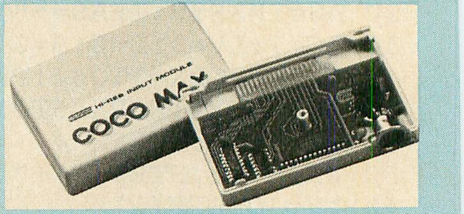
CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats: • You can move it around • Copy it • Shrink or enlarge it in both directions • Save it on the electronic ***Clipbook*** • Flip it vertically or horizontally • Rotate it • Invert it • Clear it, etc. etc.

All this is done instantly, and you can always ***undo*** it if you don't like the results.

For detail work, the ***fat bits*** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color !

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible ***lasso***.



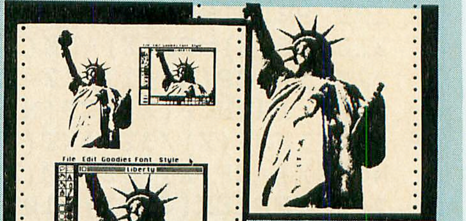
Inside the Hi-Res Input Pack

Why a Hi-Res Input Pack ?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in ***fonts*** each with 16 variations. That's over 200 typestyles !


File Edit Goodies Font Style
Liberty
Examples of printouts

Printing Your Creations

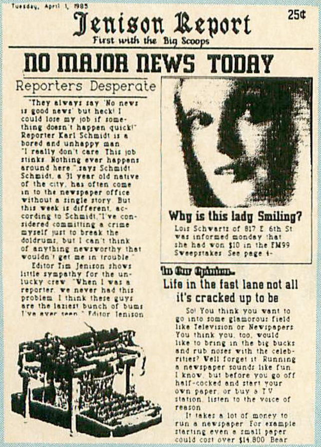
There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers !

All the CoCo Max pictures are **unretouched** screen shots or printouts (Epson RX-80).

CoCo Max II™

The whole family will enjoy CoCo Max. Here are a few examples of the possibilities.

All these pictures are **unretouched** screen photos or printouts (on an Epson RX-80).



Tuesday, April 1, 1985

Jenison Report

First with the Big Scoops

25¢

NO MAJOR NEWS TODAY

Reporters Desperate

"They always say 'No news is good news' but heck! I could lose my job if something doesn't happen quick!" Reporter Karl Schmidt is a bored and unhappy man "I really don't care This job stinks Nothing ever happens around here." says Schmidt Schmidt, a 31 year old native of the city, has often come in to the newspaper office without a single story But this week is different, according to Schmidt."I've considered committing a crime myself just to break the doldrums, but I can't think of anything newsworthy that wouldn't get me in trouble."

Editor Tim Jenison shows little sympathy for the unlucky crew "When I was a reporter, we never had this problem I think these guys are the laziest bunch of bums I've ever seen." Editor Jenison

Why is this lady Smiling?

Lois Schwartz of 817 E 6th St was informed monday that she had won $10 in the FM99 Sweepstakes See page 4-

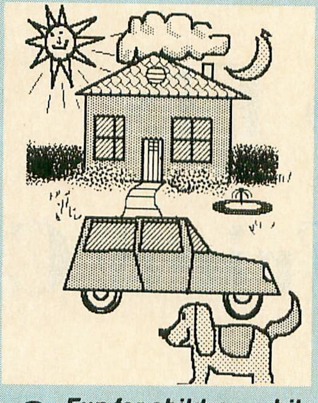
In Our Opinion..

Life in the fast lane not all it's cracked up to be

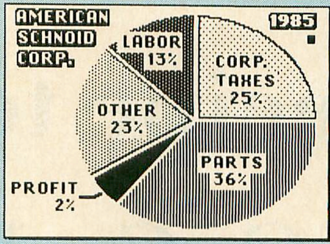
So! You think you want to go into some glamorous field like Television or Newspapers You think you, too, would like to bring in the big bucks and rub noses with the celebrities? Well forget it Running a newspaper sounds like fun I know, but before you go off half-cocked and start your own paper, or buy a T V station, listen to the voice of reason

It takes a lot of money to run a newspaper For example starting even a small paper could cost over $14,800 Bear

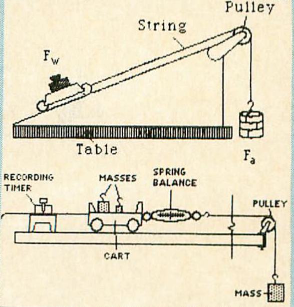
❶ *Publish a newsletter or bulletin*



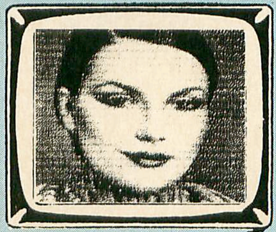
❷ *Fun for children while stimulating creativity.*



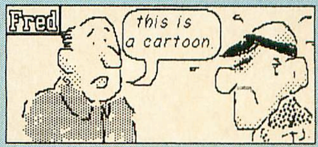
❸ *Business graphs, charts, diagrams. Also memos*



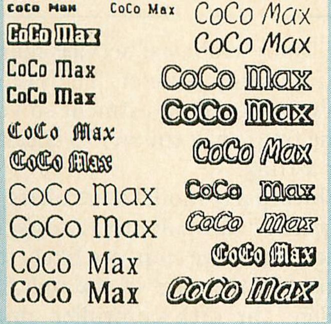
❹ *Junior's homework and science projects. Term papers too !*



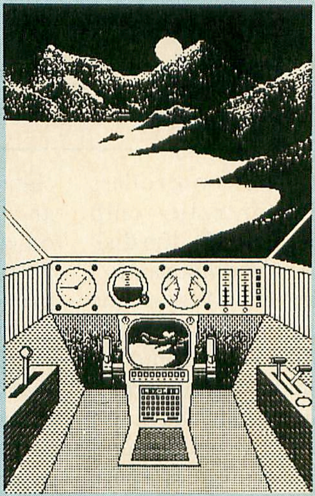
❼ *Video portrait (with optional digitizer).*



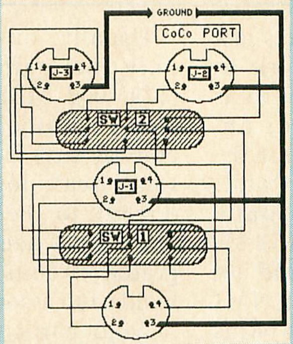
❽ *This is a cartoon.*



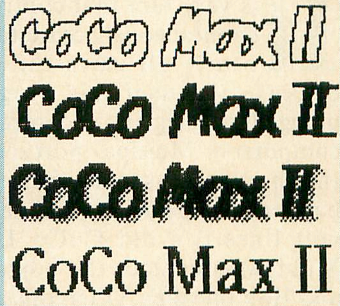
❺ *Over 200 typestyles to choose from! generate flyers.*



❻ *A new way to express your imagination.*



❾ *schematics and floor plans.*



❿ *Logos and letterheads.*

System Requirements:

Any 64K CoCo and a standard joystick or mouse. (The koala pad and the track ball work, but are not recommended.)
Disk systems need a Multi-Pak or our Y-Cable.
CoCo Max is compatible with any Radio Shack DOS and ADOS.
Note: the tape version of CoCo Max includes almost all the features of CoCo Max II except *Shrink, Stretch, Rotate,* and *Glyphics.* Also, it has 5 fonts instead of 14.
CoCo Max is not compatible with JDOS, DoubleDOS, MDOS, OS-9, the X-pad, and Daisy Wheel Printers.

Printers Supported:

Epson MX, RX, FX and LX series, Gemini, Star, Micronix, Delta 10, 10X, 15, 15X, SG-10,Okidata 82A, 92, 93, C. Itoh Pro-writer, Apple Image-writer, Hewlett-Packard Thinkjet, Radio Shack DMP 100, 105, 110, 120, 200, 400, 500, Line Printer 7, Line Printer 8, TRP-100, CGP-220. (DMP-130 use Line Printer 8), PMC printers, Gorilla Banana.
Color printing: CGP-200, CGP-115

Pricing

CoCo Max on tape with Hi-Res Pack and manual.	$69.95
CoCo Max II (disk only) with Hi-Res Pack and manual.	$79.95
Upgrade: CoCo Max to CoCo Max II New disk and manual	$19.95

New features of CoCo Max II: 14 fonts and glyphic font, dynamic shrink and stretch, rotate, multiple drive capability, 68 page scrapbook, point and click file load, color printer drivers, full error reporting.

Upgrade: CoCo Max tape to disk manuals, disk and binder	$24.95
Y-Cable: *Special Price*	$19.95
Super Picture Disks #1, #2, and #3 each:	$14.95
All three picture disks	$29.95

Guaranteed Satisfaction
Use CoCo Max for a full month. If you are not delighted with it, we will refund every penny.

Font Editor Option

A font is a set of characters of a particular style. CoCo Max includes 15 fonts. You can create new fonts of letters, or even symbols or graphics with the font editor. Examples: set of symbols for electronics, foreign alphabets, etc. $19.95

Video Digitizer DS-69

This new Low Cost Digitizer is the next step in sophistication for your CoCo Max system. With the DS-69 you will be able to digitize and bring into CoCo Max a frame from any video source: VCR, tuner, or video camera. Comes complete with detailed manual and C-SEE software on disk. Multi-Pak is required.

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A Recipe to Fix CoCo Fried Chips

By Marty Goodman

It is very rare that controllers just spontaneously cease to work. In nearly all cases the reason is because the user has plugged, unplugged, or wiggled the controller in the computer or Multipak port socket while the power was on. What usually happens is the positive and negative 12-volt lines (on old CoCo 1s and on Multipaks) contact the adjacent NMI and Halt line pins. Often this also burns out the CPU (the 6809) and/or the SAM (6883, also given as 74LS783 or 74LS785) in the computer itself. Had Tandy bothered, for about $1.50 worth of zener diodes and SCRs it could have fully protected the computer from such abuse. But in all revisions of the CoCo circuit board so far, it has not introduced such protective circuitry.

Fixing the burned out disk controller usually entails replacing the burned out chips. This is facilitated by knowing what chips are likely to get burned out and by having a full set of spares.

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His noncomputer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

Usually, on the newer controllers only the main disk controller chip (1793-002, MB8877a, or 1773), the disk ROM and the write precompensation chip (if any) is socketted. Most of the small scale logic chips are soldered directly to the board. You should be reasonably adept in desoldering integrated circuits. You should have on hand a full assortment of all chips found in your particular controller. A spare controller of the same make and model will give you access to the bigger socketted chips and the smaller chips are usually available at general IC supply houses.

On most models of CoCo disk controller, the 7416 (open collector buffer) is quite vulnerable to damage from the -12-volt supply. In three CoCo 2 controllers I have fixed, both 7416s had to be replaced. These are U3 and U8 on the older type CoCo 2 controller with a 40-pin controller chip, and U8 and U6 on the newer Tandy controller that uses the 28-pin 1773 disk controller chip. The 74LS221 (one shot delay timer) seems to often burn out as well. Occasionally the main disk controller chip does, too.

On the old CoCo 1 controller from Tandy, the 74LS02 and the 74LS04 chips (U9 and U5 on that card) have a track record of blowing — sometimes spontaneously. Be sure to look for blown 7416s and 74LS221s on that model. You should also have the associated Tandy technical service manual and a frequency counter. The potentiometers may need adjustment so you'll need the frequency counter to check for proper setting.

On third-party model controllers, the circuitry is often similar to Tandy's, and thus the vulnerable chips are likely to be the same. In the case of the old J&M controller, the disk controller chip is available only from J&M itself.

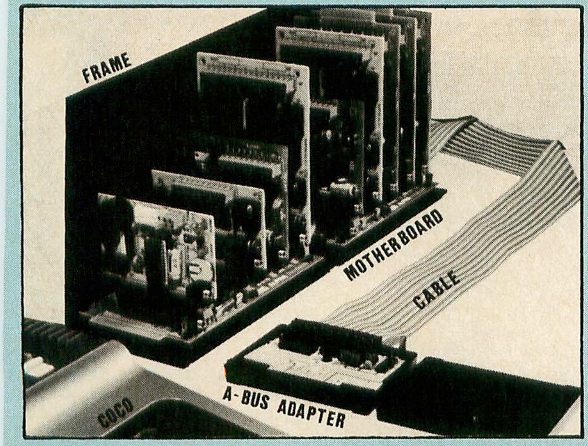
Oddly enough, the ROM chip on these controllers seldom seems to be affected. Indeed, once in the course of repairing a controller I plugged in a ROM upside down and turned on the power. After realizing my blunder, I turned off the power, inverted the ROM and tried it again. Much to my amazement, the ROM functioned just fine.

In addition to these general tips, the serious trouble-shooter will want schematic diagrams of the unit to be repaired. Tandy and HDS both supply such technical information on request and for a reasonable sum. J&M in the past was reluctant to release schematics, but may be changing its policies. DISTO agrees with the idea of releasing schematics of its products to the public, but to date has not made such information available. It is my impression that if enough customers insist on such information before buying any product from J&M or DISTO, both of these companies will quickly supply it.

The Amazing A-BUS

NEW

What will you do with it?



An A-BUS system with 2 Motherboards and 9 Cards.

SHEILA wanted to set up a variety of experiments in her lab. With an A-BUS, the computer can watch the mice instead of Sheila.

HARRY has a model railroad layout that he wished to automate. Now his home computer controls the engines, gates, signals, etc. through the A-BUS.

BOB tests electrical fixtures as they leave the assembly line. He develops test equipment quickly with inexpensive, off-the-shelf, and easy to use A-BUS cards.

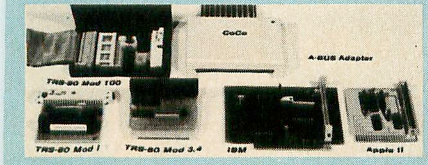
But what's an A-BUS? It's the easiest way to connect a variety of cards that sense and control anything outside the computer. With the A-BUS, your CoCo becomes an incredible machine.

What would I need? First, an *A-BUS Adapter* to convert your computer bus to the A-BUS standard. Then a *Cable* (with one or two slots) to connect one or two A-BUS Cards. If you need more than two cards, the cable will be connected instead to the *A-BUS Motherboard*, which has five slots. Up to five motherboards can be chained. Finally, add you choice of *A-BUS Cards* to fit your project.

I'm not an engineer. Can I use the A-BUS? If you can wire a switch, you can use the A-BUS. No computer hardware knowledge is needed! A screwdriver is all you need for many projects.

What about software? Simple PEEK and POKE commands control the whole system, whether you read the time on the clock, switch the relays, take a temperature reading, or turn a motor.

What if I change computers? Incredibly, this is as simple as replacing the inexpensive adapter card.



A-BUS Adapters

Special:
Complete set of all user's manuals.
Typeset, illustrated, with schematics.
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CoCo to A-BUS Adapter AR-138: $49

Works with all CoCo's. Plugs into rom slot or Multipak. Disk systems without Multipak need Y-cable ($19.95)

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AApple II, II+, IIe.	AR-134...$49
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TRS-80 Model 4P. Includes extra cable.	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus.	AR-131...$39

A-BUS Motherboard MB-120: $99

Will accomodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

A-BUS Cable (3 ft.) CA-163: $29

Connects Adapter to 1 A-BUS card or Motherboard.
Special Cable for two A-BUS cards CA-162...$39

Relay Card RE-140: $129

8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

Digital Input Card IN-141: $49

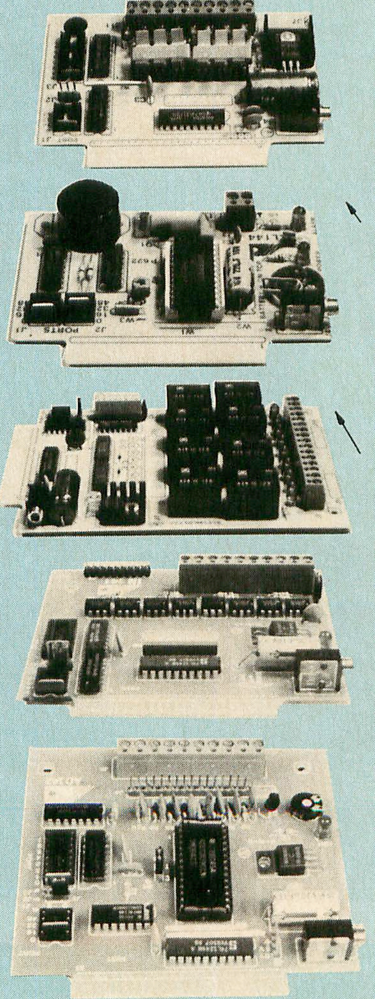
It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

Analog Input Card AD-142: $119

With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.

Prototyping Card PR-152: $15

Protocard is 3½ by 4½ in. and accepts up to 10 IC's.



12 Bit A/D Converter AN-146: $109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is −5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.

Motor Controller ST-143: $69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives **two** stepper motors (12V, bidirectional, 4 phase).

Motor: 48 steps/revolution, 300 steps/second, ¼" shaft: MO-103...$15. Power supply: PS-126...$10

Special Package: the controller card, *two* stepper motors, and power supply: **PA-181...$99**

Clock with Alarm CL-144: $89

It's the most powerful clock/calendar available. The features: • 5 second/month accuracy. • Keeps time, date, and alarm for 5 years (even with computer off). • Can time events down to 1/100 second. • Periodic "chime". • Full time and date alarm. • Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. • Easy to use,: for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.

Latest Developments

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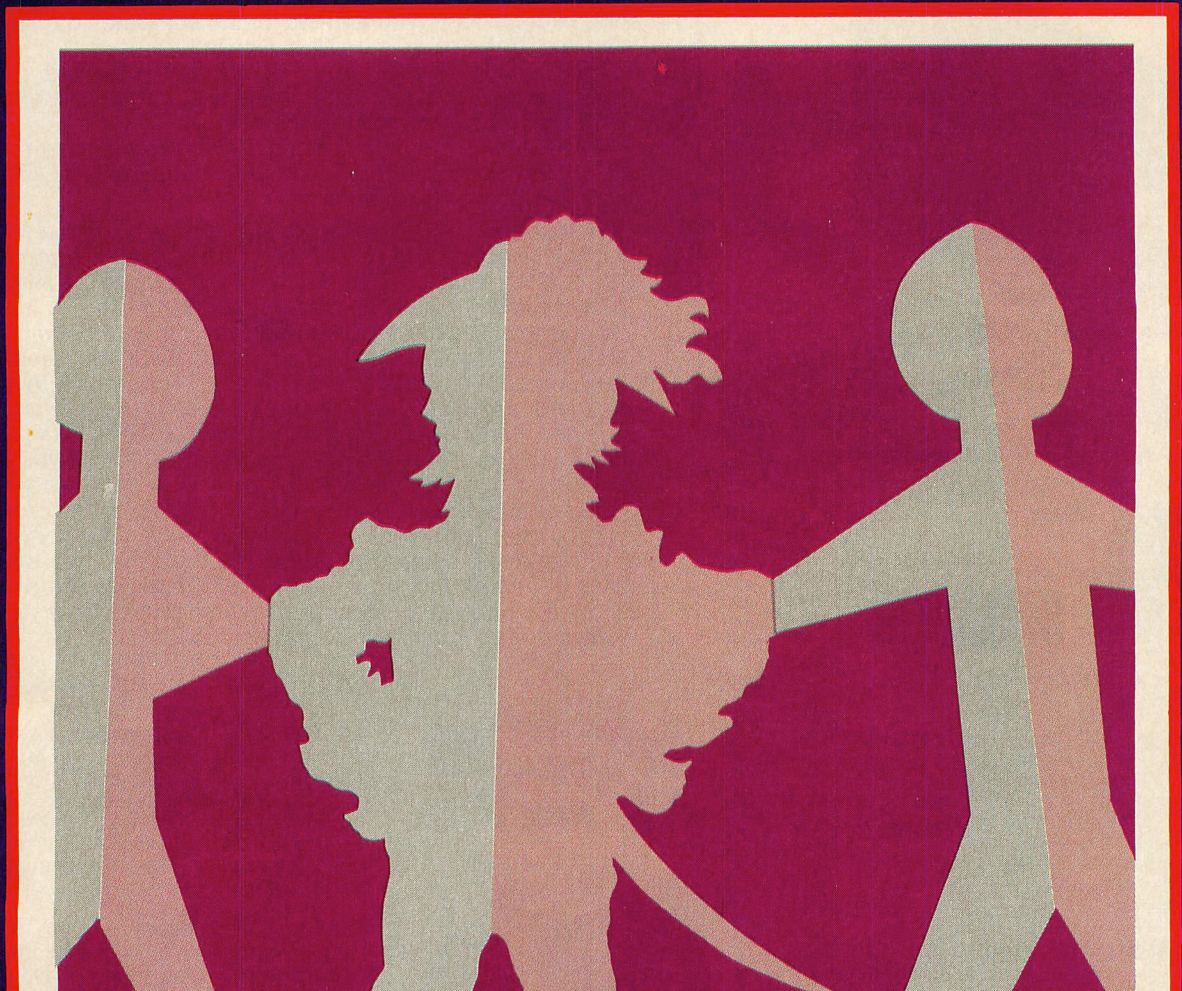

PROGRAMMING UTILITY 16K ECB

Let CoCo take the tedium out of Adventure writing and leave the creativity to you

The Adventure Processor

By Bill Cook

Developing an Adventure game is not as difficult as one might imagine. Adventures are simply a collection of data and a series of true and false tests comparing the player's inputs to a list of data stored in memory of the computer.

The simplest way to store long lists of data in a computer's memory is through the use of arrays. Writing an Adventure game generally requires that information such as room descriptions, object lists, authorized user inputs and key responses be read into arrays so that they may be called upon quickly.

Arranging the data, formatting the text screen and processing of standard commands is required in all Adventures. Some programmers accomplish it differently. I prefer to keep it simple and easy to follow, since BASIC programs should be a learning experience.

Bill Cook is a manager for the Navy Exchange in Whidbey Island, Washington. He is the author of The Adventure Generator *and wrote his first Adventure in 1982. He uses the CoCo extensively for business applications and as a management aide.*

About the Program

Imagine a program that could actually write most of the code for you, automatically! A program that could save you hours of tedious writing, testing and debugging — a program that would function error-free, and in a matter of minutes save you more than 50 percent of the work in putting together your dream program.

ADV-PRO, or Adventure Processor, is a utility to save you hours of tedious typing of repetitive code. It simply writes a "shell" of an Adventure for you. It provides the following possibilities:

Up to 100 rooms, 60 objects and 30 commands.

A separate help message for every location in the game.

Individual score values for each object found.

Customized responses for each object "examined."

Randomized object placement, if desired, to make your game play differently every time.

Scroll-protected split screens.

Save game in progress/load previous unfinished game capability.

Operates with memory-stretching `PCLEAR ZERO`.

Outputs to tape or disk.

The first step in writing an Adventure is mapping it out on paper. On your map you should indicate the major compass points at the top, bottom and sides of the sheet. N, S, E, W, Up, Down, should all be indicated for ease in laying out the Adventure.

Each location should have a number as should each object you plan to place in the game. Have a good idea of the vocabulary (verbs and nouns) you want the program to recognize; two word sentences are the standard. Once you have completed this, jot down how many rooms you'll have, the number of objects and the number of commands (verbs).

Using the Program

ADV-PRO asks you for the number of items and limits you to 100 rooms, 60 objects and 30 commands. You are also asked for the room number in which you want the game to begin and for a filename. You are then asked whether to direct the output to tape or disk. After answering these questions *ADV-PRO* goes to work and creates an Adventure "shell."

Within a few minutes, you will be

over half done with creating an efficient and versatile Adventure game. *ADV-PRO* writes to disk or tape, an ASCII file that is a loadable BASIC program. The pre-written coding sets up a machine language anti-scroll routine, frees the maximum available memory, initializes and reserves line numbers for all of your room descriptions, legal movement directions, help messages, object descriptions, noun lists, object score values, initial locations and verb lists. You simply modify the program with your customized data.

Here's a sample room description DATA line as generated: 10 DATA ROOM # 1 DESCRIPTION,0,0,0,0,0,0, HELP MESSAGE HERE.

If you want room one to be described to the user: YOU ARE IN THE LIVING ROOM, simply change the line as follows: 10 DATA IN THE LIVING ROOM ,0,0,0,0,0,0,HELP MESSAGE HERE. Notice that the "you are" is not necessary. The program automatically precedes each room description with "you are."

Next you decide in which directions the player will be able to move from this room. Let's assume that moving north takes you to room three, south to room four, east to room six, west to room 10, up and down lead nowhere. These locations should replace the series of zeroes that come next in the above data statement. Rooms that lead nowhere remain at zero. The line would now read like this:

```
10 DATA IN THE LIVING ROOM,3,4,
6,10,0,0,HELP MESSAGE HERE
```

Now for the help message. Assume that the player is in room one and he enters the command HELP. The remainder of the DATA statement should contain whatever response you would like the player to receive. For example, YOU SENSE A PRESENCE HERE. This phrase becomes the final part of the DATA statement:

```
10 DATA IN THE LIVING ROOM
,3,4,6,10,0,0,YOU SENSE A PRES
ENCE HERE
```

If you would like no help to be given to the user, simply leave off the phrase with the comma preceding it. This causes an automatic response of NO HELP HERE. Here's how the line would look:

```
10 DATA IN THE LIVING ROOM
,3,4,6,10,0,0
```

The standard format for object data looks like this:

```
152 DATA OBJECT # 1 DESCRIPTION,
KEYWORD,0,0,RESPONSE WHEN
EXAMINED
```

As with the room descriptions, modify the line to enter your object description. Let's assume your first object is a small rusty knife, you want it located in room six, it is worth 10 points if carried and if the player says EXAMINE KNIFE you want the game to respond with IT HAS A PEARL HANDLE. Here's how your modified line should look:

```
152 DATA A SMALL RUSTY KNIFE,
KNIFE,6,10,IT HAS A PEARL
HANDLE.
```

If you would like an object to be placed in the player's inventory initially, use location -1. If you would like an object to be placed in a randomized location (unknown), use location -2. Use of randomized object locations will make your game play differently every time.

Commands

The first seven commands the game recognizes are already built in to the game. They are: EXAMINE, INVENTORY, QUIT, SCORE, HELP, SAVE and LOAD. All the necessary coding for these commands to function is already written into your program. You can, of course, modify the code, but it will function as is. The remaining commands (if you specified more than seven) are represented in the program as null strings. The line would look like this:

```
508 V$( 8)=""
```

If you want the eighth command to be GET, simply change the line as follows:

```
508 V$( 8)="GET"
```

After making the changes to include the entire verb list, you are finished with the data portion of the Adventure.

Verb processing and conditional statements are the toughest parts of Adventure programming, and the most time-consuming. Let's still assume verb eight is GET. Processing for verb eight is accomplished between lines 7500 and 7990. This is the area where you process the different possibilities of reactions to the player's use of the verb GET. This is where you exercise your own programming talent and creativity. Here is a brief sample of what could be done:

```
7510 IF LO(N)=-1 THEN PRINT"YOU
ALREADY HAVE IT.":GOTO 60000
7520 IF LO(N)< >L THEN PRINT"I
DON'T SEE IT.":GOTO 60000
7530 IF CA=5 THEN PRINT"YOUR
ARMS ARE FULL.":GOTO 60000
7540 LO(N)=-1:CA=CA+1:PRINT
"OKAY. YOU HAVE IT.":GOTO 60000
```

Line 7510 checks to see if the object is already in the player's inventory and, if so, responds. Line 7520 checks to see if the object is in the current room and, if not, responds. Line 7540 places th object in inventory, increments th number of objects carried by one, an responds that you have the object.

Significant Variables
(In order of appearance)

R	Total number of rooms in the game
R$(n)	Description of room n
D(n,nn)	Authorized directions from room n
H$(n)	Help messages when in room n
O	Total number of objects
O$(n,1)	Description of object n
O$(n,2)	Keyword in description for object n
LO(n)	Room location of object n
SC(n)	Score value of object n
O$(n,3)	Response when object n is examined
V$(n)	Command (verb) n
NV	Total number of verbs
V1$	String containing first four characters of each verb
N1$	String containing first four characters of each object
C$(d)	Labels for directions
L	Player's current location
L5	Temporary location storage flag
LN	Line counter
Z	Temporary flag for inventory test
P	Test location for anti-scrolling
TURNS	Turn counter
I$	User's input
V2$	User's command (verb)
N2$	User's object (noun)
V$	Truncated verb
N$	Truncated noun
V	Verb number
N	Noun number
SC	Score counter
MX	Possible score
DV	Device number for loading/saving -1=tape 1=disk
F$	Filename for saving/loading

With a little experimentation and patience, you will be writing professional quality Adventures in no time. I look forward to seeing your contributions in future issues of this magazine and wish you happy Adventuring.

(You may direct questions about this program to Mr. Cook at 4346 Rhododendron Drive, Oak Harbor, WA 98277, 206-679-5220. Please enclose an SASE when writing.) □

520	32	1040	220
560	241	1115	217
605	130	1200	214
720	143	1290	213
808	40	1350	30
890	38	END	7

The listing: ADV-PRO

```
1 'ADV-PRO
2 '(C) 1986 ALL RIGHTS RESERVED
3 'PROGRAM BY BILL COOK
4 'ISLAND SOFTWARE
5 '
6 'AN ADVENTURE PROCESSOR
7 '
10 GOTO63950
20 'initialize
100 CLEAR1500:CS$=CHR$(142):EL$=
STRING$(32,32):SG$=STRING$(32,21
7):X=0
110 DIMV(31),V$(30):V$(1)="EXAMI
NE":V$(2)="INVENTORY":V$(3)="QUI
T":V$(4)="SCORE":V$(5)="HELP":V$
(6)="LOAD":V$(7)="SAVE"
170 GOTO500
172 A$=STR$(LN)+A$:PRINT#DV,A$:P
RINT@128,A$:PRINTEL$;EL$;EL$:LN=
LN+G:RETURN
320 'centering routine
330 T=LEN(T$):PRINTTAB(INT(32-T)
/2);T$:RETURN
470 'title routine
480 CLS:T$="ADVENTURE PROCESSOR"
:GOSUB330:T$="(C) 1986 BY BILL C
OOK":GOSUB330:PRINTSG$:RETURN
500 GOSUB480
510 INPUT"NUMBER OF ROOMS (1-100
)";RM:IFRM=0 OR RM>100 THEN510
520 INPUT"NUMBER OF OBJECTS (1-6
0)";NO:IFNO=0 OR NO>60 THEN 520
530 INPUT"NUMBER OF VERBS INCLUD
ING THE   7 BUILT-IN (1-30)";NV:
IFNV=0 OR NV>30 THEN 530
531 GOSUB480:INPUT"ADVENTURE TO
START IN WHICH ROOMNUMBER";L:IFL
<1 OR L>RM THEN 531
532 GOSUB480:LINEINPUT"FILENAME
(8 CHARS.MAX.):";F1$:IFLEN(F1$)>
8 THEN532 ELSE IFINSTR(F1$,".")>
0 OR INSTR(F1$,"/")>0 THEN532
534 LINEINPUT"OUTPUT TO DISK OR
TAPE (D/T)?";DT$:IFDT$="D"THENDV
=1:F1$=F1$+"/BAS": ELSE IFDT$="T
"THENDV=-1 ELSE 534
535 IFDV=-1THENLINEINPUT"PRESS E
NTER WHEN TAPE READY";Z$
536 OPEN"O",#DV,F1$
540 LN=0:G=1
541 REM process initialization
546 A$="GOTO63950":GOSUB172
550 A$="CLEAR600,&H7FB5:IFPEEK(&
H7FB6)=57THEN4":GOSUB172
560 A$="Y=0:DX$="+CHR$(34)+"BE01
68AF8C0C308C0CBF01688639A78CEF39
5555023417 0D6F26109E888C05E02D09
810D270A8C05FF270535176E9CE2A68C
E1C6203DC3040030 8C0934101F013416
7EA34E0A8920E2"+CHR$(34):GOSUB17
2
570 A$="FORP=1TOLEN(DX$) STEP2:A
$="+CHR$(34)+"&H"+CHR$(34)+"+MID
$(DX$,P,2):A=VAL(A$):POKE&H7FB6+
Y,A:Y=Y+1:NEXT:EXEC&H7FB6":GOSUB
172
580 A$="POKE&H7FCA,8":GOSUB172
590 A$="DIMR$(100),RM(100),D(100
,6),H$(100),V$(30),O$(60,3),LO(6
0),SC(60),C$(6)":GOSUB172
591 A$="REM FORMAT FOR ROOM DATA
=DESCRITION,DESTINATIONS(N,S,E,W
,U,D),HELP RESPONSE":GOSUB172
592 LN=10:G=1:FORQP=1TORM:A$="DA
TA ROOM #"+STR$(QP)+" DESCRIPTIO
N,0,0,0,0,0,0,HELP MESSAGE HERE"
:GOSUB172:NEXT
595 LN=150:G=1
600 A$="R="+STR$(RM)+":FORI=1TOR
:READR$(I):FORA=1TO6:READD(I,A):
NEXT:READH$(I):NEXT":GOSUB172
601 A$="REM FORMAT FOR OBJECT DA
TA=DESCRIPTION,KEYWORD,ROOM #LOC
ATION,POINT #VALUE,RESPONSE WHEN
 EXAMINED":GOSUB172
602 FORQP=1TONO:A$="DATA OBJECT
#"+STR$(QP)+" DESCRIPTION,KEYWOR
D,0,0,RESPONSE WHEN EXAMINED":GO
SUB172:NEXT
605 LN=500:G=1
610 A$="O="+STR$(NO)+":FORI=1TOO
:READO$(I,1),O$(I,2),LO(I),SC(I)
,O$(I,3):NEXT:T=RND(-TIMER):FORI
=1TOO:IFLO(I)=-2 THENLO(I)=RND(O
):NEXT:ELSENEXT":GOSUB172
612 FORQP=1TONV:A$="V$("+STR$(QP
)+")="+CHR$(34)+V$(QP)+CHR$(34):
GOSUB172:NEXT
620 LN=1000:G=10
630 A$="NV="+STR$(NV)+":FORI=1TO
NV:V1$=V1$+LEFT$(V$(I),4):NEXT":
GOSUB172
640 A$="FORI=1TOO:N1$=N1$+LEFT$(
O$(I,2),4):NEXT":GOSUB172
650 LN=3050
660 A$="DATANORTH,SOUTH,EAST,WES
T,UP,DOWN:FORDD=1TO6:READC$(DD):
NEXTDD":GOSUB172
670 LN=3100:G=10
690 A$="L="+STR$(L)+":L5="+STR$(
L)+":T=0:SG$=STRING$(32,217):EL$
=STRING$(32,32):CLS:LN=0":GOSUB1
```

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The analysis can be saved in a "data file" which can be loaded into DYNACALC or read in by @SUMMARY for future additions to the analysis. If you use other Spreadsheets such as ELITE*CALC then you have added a graphing feature to your spreadsheet applications. The analysis can also be saved in an ASCII file which can be read by word processors for inclusion in a report.

@SUMMARY is compatible with any spreadsheet program that can generate an ASCII text file of worksheets.

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Use CoCo Max, Graphicom or other graphics programs to create letter heads and print them while using Telewriter-64.

Telegraphics interfaces with Radio Shack, Epson, Gemini, C-Itoh and Okidata printers having dot-addressable graphics. A simple modification to Telewriter-64 will allow you to exit Telewriter via the DISK I/O MENU and print out the graphic without affecting any of your text in the buffer.

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```
72
700 REM process adv screen
710 L1=LN:A$="PRINT@0,"+CHR$(34)
+"YOU ARE "+CHR$(34)+"R$(L)"+CHR
$(34)+"."+CHR$(34):GOSUB172
720 A$="PRINT"+CHR$(34)+"YOU SEE
:"+CHR$(34)+";":GOSUB172
730 A$="Z=0:FORA=1TOO":GOSUB172
740 A$="IFLO(A)=L AND POS(0)+LEN
(O$(A,1))>32 THENPRINT":GOSUB172
750 A$="IFLO(A)=L THENPRINTO$(A,
1)+CHR$(44);:Z=1":GOSUB172
760 A$="NEXT:PRINTCHR$(8);"+CHR$
(34)+"."+CHR$(34)+";":GOSUB172
770 A$="IFZ=0THENPRINTCHR$(8)+"+
CHR$(34)+":NOTHING OF INTEREST."
+CHR$(34):GOSUB172
780 A$="PRINT:PRINT:PRINT"+CHR$(
34)+"OBVIOUS EXITS LEAD: "+CHR$(
34):GOSUB172
790 A$="FORG=1TO6:IFD(L,G)<>0THE
NPRINTC$(G)+CHR$(32);":GOSUB172
800 A$="NEXT:PRINT:PRINTSG$;:P=P
EEK(136)*256+PEEK(137)-1024:POKE
&H7FCA,INT(P/32)":GOSUB172
802 A$="FORI=P+1024 TO 1504 STEP
32:IFPEEK(I)=217THEN LN=I:ELSE N
EXTI":GOSUB172
803 A$="IFLN>0 THENFORJ=P TO LN-
1024 STEP32:PRINT@J,EL$;:NEXTJ:L
N=0":GOSUB172
804 REM welcome
805 MG$="WELCOME TO THE WONDERFU
L WORLD  OF ADVENTURE. GOOD LUCK
!"
807 A$="IFTURNS=0THENPRINT@480,"
+CHR$(34)+MG$+CHR$(34):GOSUB172
808 REM player input
810 L2=LN:A$="PRINT@480,;:TURNS=
TURNS+1:I$="+CHR$(34)+CHR$(34)+"
:LINEINPUT"+CHR$(34)+"WHAT NOW?
"+CHR$(34)+";I$":GOSUB172
820 A$="IFI$="+CHR$(34)+CHR$(34)
+"THENPRINT"+CHR$(34)+"WHAT?"+CH
R$(34)+":GOTO"+STR$(L2):GOSUB172
830 A$="IFI$="+CHR$(34)+"LOOK"+C
HR$(34)+"THEN"+STR$(L1):GOSUB172
840 A$="IFLEN(I$)>1THEN"+STR$(LN
+40):GOSUB172
850 A$="L5=L":GOSUB172
860 A$="G=INSTR("+CHR$(34)+"NSEW
UD"+CHR$(34)+",I$):IFG=0THENPRIN
T"+CHR$(34)+"I DON'T UNDERSTAND.
"+CHR$(34)+":GOTO"+STR$(L2):GOSU
B172
870 A$="IFD(L,G)>0THEN L5=D(L,G)
:L=L5:GOTO"+STR$(L1)+":ELSEPRINT
"+CHR$(34)+"YOU CAN'T GO THAT WA
Y."+CHR$(34)+":GOTO"+STR$(L2):GO
SUB172
880 A$="I$=I$+"+CHR$(34)+" "+CHR
$(34)+":SP=INSTR(I$,CHR$(32))":G
OSUB172
890 A$="V2$=LEFT$(I$,SP-1):N2$=M
ID$(I$,SP+1):V$=LEFT$(V2$,4):N$=
LEFT$(N2$,4):V=INSTR(V1$,V$):N=I
NSTR(N1$,N$)":GOSUB172
900 A$="IFV=0THENPRINT"+CHR$(34)
+"I DON'T UNDERSTAND."+CHR$(34)+
":GOTO"+STR$(L2)+":ELSEV=(V-1)/4
+1":GOSUB172
910 A$="IFN=0THENPRINT"+CHR$(34)
+"I DON'T UNDERSTAND."+CHR$(34)+
":GOTO"+STR$(L2)+":ELSEN=(N-1)/4
+1":GOSUB172
915 REM on goto
920 L3=LN:A$="ON V GOTO"
930 LL=4000
940 FORI=1TONV
950 LL$=STR$(LL):T=LEN(LL$):LL$=
RIGHT$(LL$,T-1)
960 A$=A$+LL$+","
970 V(I)=LL:LL=LL+500
980 NEXT
990 T=LEN(A$):A$=LEFT$(A$,T-1)
992 GOSUB172:GOSUB480
1000 FORI=1TONV
1010 LN=V(I):A$="REM VERB #"+STR
$(I)+" "+V$(I):GOSUB172
1011 REM default each verb
1012 LN=V(I)+490:A$="PRINT"+CHR$
(34)+"I DON'T UNDERSTAND."+CHR$(
34)+":GOTO"+STR$(L2)
1015 GOSUB172
1020 NEXT
1025 REM examine
1030 LN=V(1)+10
1040 A$="IF LO(N)<>-1 AND LO(N)<
>L THENPRINT"+CHR$(34)+"YOU CAN'
T EXAMINE SOMETHING YOU DO NOT H
AVE OR CANNOT SEE."+CHR$(34)+":G
OTO"+STR$(L2):GOSUB172
1042 A$="IFO$(N,3)="+CHR$(34)+CH
R$(34)+"THENPRINT"+CHR$(34)+"NOT
HING SPECIAL."+CHR$(34)+":GOTO"+
STR$(L2):GOSUB172
1043 A$="PRINTO$(N,3):GOTO"+STR$
(L2):GOSUB172
1045 REM inventory
1050 LN=V(2)+10
1060 A$="PRINT"+CHR$(34)+"YOUR I
NVENTORY:"+CHR$(34)+":NH=0":GOSU
B172
1070 A$="FORI=1TOO:IFLO(I)=-1THE
NNH=1:PRINTO$(I,1)":GOSUB172
1080 A$="NEXT:IFNH=0THENPRINT"+C
HR$(34)+"NOTHING."+CHR$(34):GOSU
B172
```

```
1090 A$="GOTO"+STR$(L2):GOSUB172
1095 REM quit
1100 LN=V(3)+10
1110 A$="SC=0:PRINT"+CHR$(34)+"G
AME ENDS AFTER"+CHR$(34)+"TURNS"
+CHR$(34)+"TURNS."+CHR$(34)+":FO
RI=1TOO:IFLO(I)=-1THENSC=SC+SC(I
):NEXT:ELSENEXT":GOSUB172
1115 A$="PRINT"+CHR$(34)+"YOU SC
ORED"+CHR$(34)+"SC"+CHR$(34)+"PO
INTS."+CHR$(34)+":POKE&H7FCA,0:P
OKE&HBA,PEEK(&HBC):POKE&HB7,PEEK
(&HBC)+6:END":GOSUB172
1118 REM score
1120 LN=V(4)+10
1130 A$="SC=0:MX=0:FORI=1TOO:IFL
O(I)=-1THENSC=SC+SC(I):MX=MX+SC(
I):NEXT:ELSEMX=MX+SC(I):NEXT":GO
SUB172
1140 A$="PRINT"+CHR$(34)+"YOU HA
VE SCORED"+CHR$(34)+"SC:PRINT"+C
HR$(34)+"OUT OF A POSSIBLE"+CHR$
(34)+"MX:GOTO"+STR$(L2):GOSUB172
1145 REM help
1150 LN=V(5)+10
1160 A$="IFH$(L)="+CHR$(34)+CHR$
(34)+"THENPRINT"+CHR$(34)+"NO HE
LP HERE."+CHR$(34)+":GOTO"+STR$(
L2)+" ELSEPRINTH$(L):GOTO"+STR$(
L2):GOSUB172
1165 REM check for get or drop
1170 LN=60000:A$=" IFV$="+CHR$(3
4)+"GET"+CHR$(34)+"THEN"+STR$(L1
):GOSUB172
1180 A$=" IFV$="+CHR$(34)+"DROP"
+CHR$(34)+"THEN"+STR$(L1):GOSUB1
72
1190 A$=" GOTO"+STR$(L2):GOSUB17
2
1195 REM load
1200 LN=V(6)+10
1210 A$="LINEINPUT"+CHR$(34)+"FI
LENAME TO LOAD:"+CHR$(34)+";F$":
GOSUB172
1220 A$="IFLEN(F$)>8THENPRINT"+C
HR$(34)+"TOO LONG."+CHR$(34)+":G
OTO"+STR$(LN-10):GOSUB172
1230 A$="PRINT"+CHR$(34)+"TAPE O
R DISK? (T/D)"+CHR$(34):GOSUB172
1240 A$="A$=INKEY$:IFA$="+CHR$(3
4)+CHR$(34)+"THEN"+STR$(LN)+" EL
SE A=INSTR("+CHR$(34)+"TD"+CHR$(
34)+",A$):IFA=0 THEN"+STR$(LN)+"
 ELSE IFA=1 THENDV=-1 ELSEDV=1":
GOSUB172
1250 A$="IFDV=-1THENPRINT"+CHR$(
34)+"READY TAPE, PRESS ENTER.."+
CHR$(34)+";:LINEINPUTZ$":GOSUB17
2
1260 A$="PRINT"+CHR$(34)+"LOADIN
G "+CHR$(34)+";F$:OPEN"+CHR$(34)
+"I"+CHR$(34)+",DV,F$:FORI=1TOO:
INPUT#DV,LO(I):NEXT:INPUT#DV,L,T
URNS,CA":GOSUB172
1270 A$="CLOSE:GOTO60000":GOSUB1
72
1275 REM save
1280 LN=V(7)+10
1290 A$="LINEINPUT"+CHR$(34)+"FI
LENAME FOR SAVING:"+CHR$(34)+";F
$":GOSUB172
1300 A$="IFLEN(F$)>8THENPRINT"+C
HR$(34)+"TOO LONG."+CHR$(34)+":G
OTO"+STR$(LN-10):GOSUB172
1310 A$="PRINT"+CHR$(34)+"TAPE O
R DISK? (T/D)":GOSUB172
1320 A$="A$=INKEY$:IFA$="+CHR$(3
4)+CHR$(34)+"THEN"+STR$(LN)+" EL
SE A=INSTR("+CHR$(34)+"TD"+CHR$(
34)+",A$):IFA=0THEN"+STR$(LN)+"
ELSEIFA=1THENDV=-1 ELSEDV=1":GOS
UB172
1330 A$="IFDV=-1THENPRINT"+CHR$(
34)+"READY TAPE, PRESS ENTER.."+
CHR$(34)+";:LINEINPUTZ$":GOSUB17
2
1340 A$="PRINT"+CHR$(34)+"SAVING
 "+CHR$(34)+";F$:OPEN"+CHR$(34)+
"O"+CHR$(34)+",DV,F$:FORI=1TOO:P
RINT#DV,LO(I):NEXT:PRINT#DV,L,TU
RNS,CA":GOSUB172
1350 A$="CLOSE:GOTO60000":GOSUB1
72
1355 REM pclear zero
1360 LN=63950
1370 A$="POKE&H3C0,&H5F:POKE&H3C
1,&H5C":GOSUB172
1380 A$="POKE&H3C2,&H96:POKE&H3C
3,&HBC":GOSUB172
1390 A$="POKE&H3C4,&H1F:POKE&H3C
5,&H02":GOSUB172
1400 A$="POKE&H3C6,&H7E:POKE&H3C
7,&H96:POKE&H3C8,&HA3":GOSUB172
1410 A$="EXEC&H3C0:GOTO1":GOSUB1
72
9999 END
63949 'pclear zero
63950 POKE&H3C0,&H5F:POKE&H3C1,&
H5C
63960 POKE&H3C2,&H96:POKE&H3C3,&
HBC
63970 POKE&H3C4,&H1F:POKE&H3C5,&
H02
63980 POKE&H3C6,&H7E:POKE&H3C7,&
H96:POKE&H3C8,&HA3
63990 EXEC&H3C0:GOTO20
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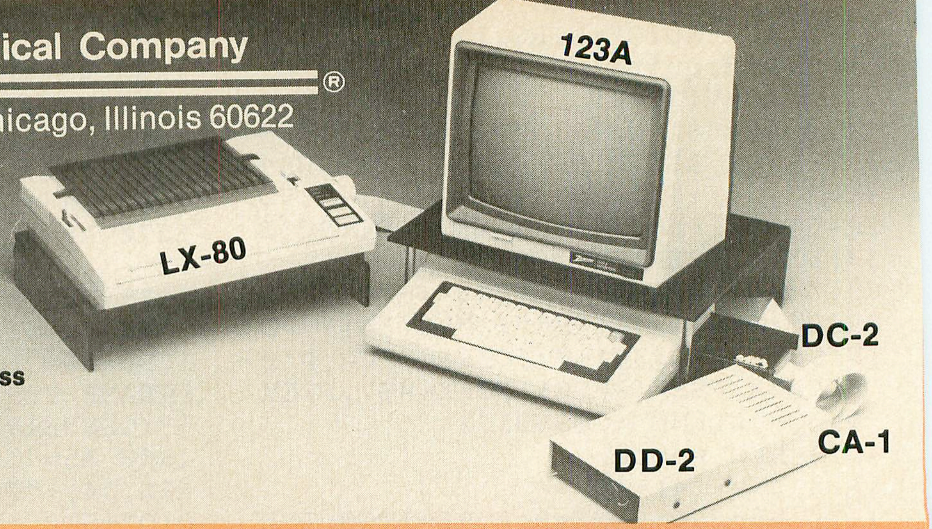

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The new Epson LX-80 offers printing flexibility in two modes: one mode allows you to print in a quick (100 cps) dot-matrix style for programming and graphics, and the Near Letter Quality mode (16 cps) produces precise (240 dots per inch), beautiful type for correspondence, reports, and similar purposes. The LX-80 offers 160 different type-style combinations, including Pica, Elite, Enlarged, Emphasized, Condensed, Subscripts and Superscripts, and type-styles can be selected quickly from the top control panel or from program control. Comes standard in friction feed; tractor option is also available.

LX-P package includes an LX-80, a serial interface, a Color Computer to Epson cable, and Printer Tutorial that teaches you how to program the different type styles ($29.95 value).

LX-P: LX-80 package $317 ($7 shpg)

ET-1 tractor option for LX-80. $29.50.

SF-1 Single-sheet feeder for the LX-80. $145 ($7 shpg)

Epson	RX-80 FT	repack	$207.
Epson	LX-80 New		$249.
Botek	Serial to parallel converter		$68.45
Howard	CoCo to Epson cable		$25.

DM-1	Disk mailer holds from one to five diskettes 200 lb. cardboard construction 25 mailers/box	$20.

MONITORS

123 Zenith 12" Green Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$114** ($7 shpg)

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122 Zenith 12" Amber Screen, 640 dots x 200 dots resolution, 15 MHz band width. **$117** (7 shpg)

141 Roland 13" Color Monitor with speaker, 270 dots x 200 dots resolution, 4MHz band width **$247** ($12 shpg)

All monitors require video controller.
Reverse video free with monitor order.

MEMORY

64K Upgrades—1 Year Warranty

64-E1 for E Boards with complete instructions. Remove old chips and replace with preassembled package—no soldering or trace cuts. **$28.45** ($2 shpg)

64-F1 for F Boards. No soldering needed. Capacitor leads must be cut. **$24.45** ($2 shpg)

64-2 for COCO 2. Kit requires one solder point, no *trace cuts.* **$24.45** ($2 shpg)

CONTROLLERS

New Controller from J&M: Has switch that allows either JDOS or RS DOS to be the disk operating system; eliminates software compatibility problems, while preserving the advantages of J&M's gold contacts and data separator. Also added to the DC-2 is a parallel port, which means a serial interface is no longer needed to make a parallel printer (like the Epson) work.

DC-2 Disk Controller with JDOS. **$128** ($2 shpg)

RS-1: RS DOS ROM Chip. $20.00 ($2 shpg)

DC-1 Disk Controller reads and writes to 35 and 40 track single and double-sided drives for *all* models of the Color Computer w/ JDOS. **$128** ($2 shpg)

VC-1 Video Interface mounts inside Color Computer by piggy-backing IC on top of interface—no soldering, no trace cuts. All models give composite video & sound. **$24.45** ($2 shpg)

VC-2 for COCO 2—mono only. **$26.45** ($2 shpg)

VC-3 for COCO 2—both color or monochrome **$39.45** ($2 shpg)

VC-4 for new Color Computer (no sockets, chips are soldered to mother board). Attaches with spring-loaded clips. Color or mono. **$39.45** ($2 shpg)

EPSON AND J&M

The EJ-P Package

The Epson LX-80 Printer teamed with our new J&M DC-2 Controller gives you top printing capabilities *plus* built-in switch gives JDOS or Radio Shack DOS so all software can run on your Color Computer. Package includes: Epson LX-80 Printer with ET-1 tractor; DC-2 controller; parallel Color Computers to J&M cable; Epson Printer Tutorial ($29.95 value).

Complete EJ-P package $425.00 ($7 shpg)

DD-2	Double sided 360K disk with ½ height case & heavy duty power supply	**$188.**
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DE-1	Disk enclosure ½ height with power supply	**$58.**

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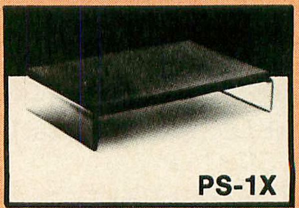

New TS-1X Monitor Stand: De signer-beautifu stand with clea corner posts easy side acces to ROM port, reset and on/of buttons. **$39.50** ($3 shpg)

TS-1: Standard 13" monitor stand for the original Colo Computer. Specify black, ivory or clear. 15" × 11" × 4" **$29.50** ($3 shpg)

TS-2: Same as above for the COCO 2. **$29.50** ($3 shpg)

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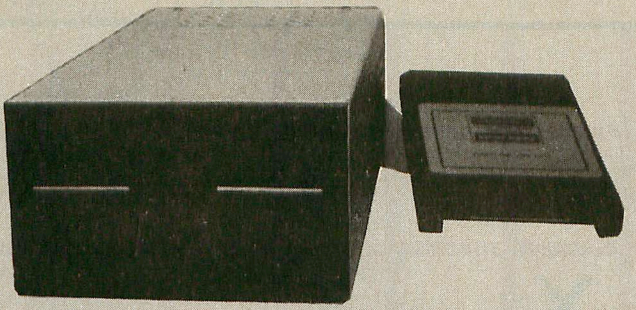

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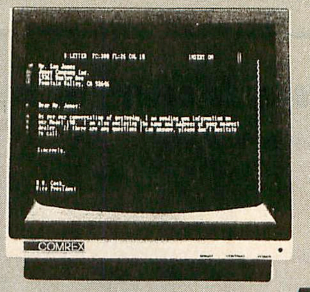

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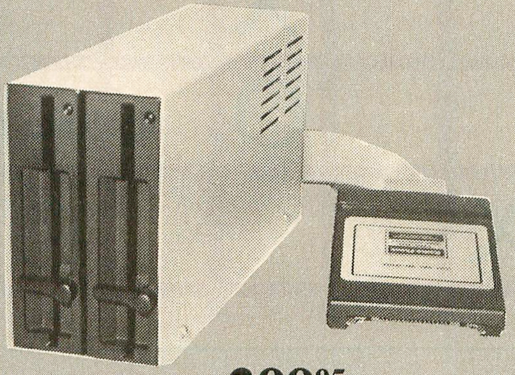

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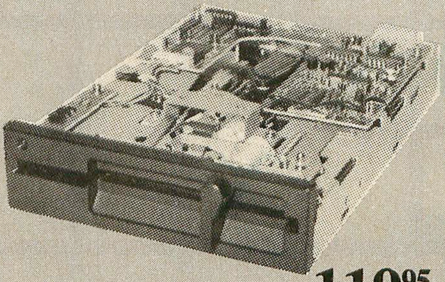

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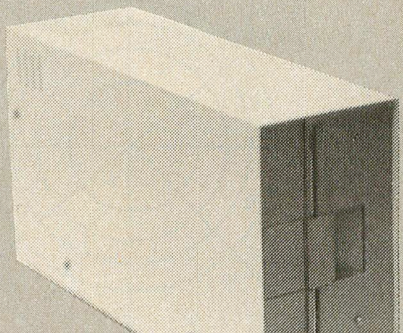

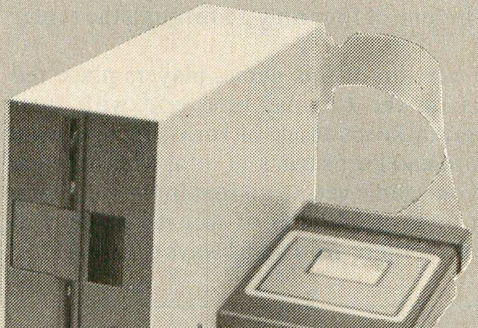

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An old favorite comes to the computer

Tic-Tac-CoCo

By James W. Wood

Polar Tic Tac Toe is more than the old standby game with the three-by-three grid. The game is played on the pattern in Figure 1.

To win this game a player must place his mark in four adjacent positions. These four may be in a semicircle within any of the four circles. Or the winning four marks can be in a straight line. This line of four may go through the center of the pattern.

In the computer version of this game, players place red and green sections on the original blue grid with their joysticks. The program keeps track of turns, recognizes a winning combination and keeps track of total wins for each player. The loser of one game gets to go first in the following game. There are a total of 52 ways to win the game. But don't get overconfident, there are also 52 ways to lose. Good luck. □

James Wood is in his fifteenth year of teaching at Atwood Hammond High School in Atwood, Illinois. His subjects include photography, physics, chemistry, computer programming and math courses. He holds master's degrees in both instructional media and physical science education.

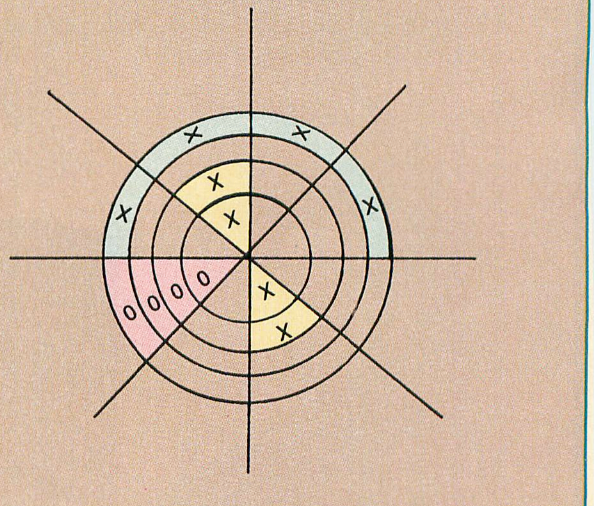

Figure 1:
Examples of Winning Combinations

The listing: TICTACTO

```
10 REM JAMES W. WOOD, JAN 86
20 CLS:PRINT@40,"POLAR TIC TAC T
OE":PRINT:PRINT" USE JOYSTICK TO
 POSITION YOUR":PRINT"MARKER. PR
ESS BUTTON TO PLACE":PRINT"MARKE
R DOWN. FOUR IN A LINE":PRINT"OR
 FOUR IN A SEMICIRCLE WINS.":PRI
NT"AFTER A WIN, BOTH BUTTONS":PR
INT"MUST BE PRESSED TO CONTI
30 PRINT:INPUT"LEFT PLAYER'S NAM
E";LP$:PRINT"YOU WILL BE RED"
40 PRINT:INPUT"RIGHT PLAYER'S NA
ME";RP$:PRINT"YOU WILL BE GREEN"
50 FORT=1TO800:NEXTT
```

```
60 DIM D(32)
70 PMODE3,1:PCLS:SCREEN1,0:NP=0
80 RESTORE:COLOR2,1
90 FOR A=30 TO 90 STEP 20
100 CIRCLE(130,100),A
110 NEXTA
120 DRAW"BM40,100R180L90NU90ND90
NE63NG63F63H126"
130 FOR A=1 TO 32:READ B,C
140 PAINT(B,C),3,2:NEXT A
150 DATA 68,48,124,16,136,16,192
,44,204,104,180,156,84,156,48,10
4
160 DATA68,96,124,36,136,36,176,
57,180,105,160,141,96,141,68,105
170 DATA 96,72,124,57,134,57,164
,72,160,105,136,132,108,126,88,1
05
180 DATA 108,87,124,78,136,75,14
8,87,140,105,132,108,124,108,108
,105
190 IF JW=0 THEN 230
200 NP=NP+1:IF NP=33 THEN 570 EL
SE COLOR2,1:LINE(30,50)-(40,60),
PSET,BF:COLOR1,1:LINE(215,50)-(2
25,60),PSET,BF:COLOR2,1:LINE(215
,50)-(225,60),PSET,B
210 J0=JOYSTK(0)*4:J1=JOYSTK(1)*
3:P=PPOINT(J0,J1):PSET(J0,J1,2):
FORT=1TO20:NEXTT:PSET(J0,J1,P):I
F P<>3 THEN 210
220 PE=PEEK(65280):IF PE=126 OR
PE=254 THEN PAINT(J0,J1),1,2:GOS
UB 270 ELSE 210
230 NP=NP+1:IF NP=33 THEN 570 EL
SECOLOR4,1:LINE(30,50)-(40,60),P
SET,BF:COLOR2,1:LINE(215,50)-(22
5,60),PSET,BF
240 J0=JOYSTK(0):J0=JOYSTK(2)*4:
J1=JOYSTK(3)*3:P=PPOINT(J0,J1):P
SET(J0,J1,2):FORT=1TO20:NEXTT:PS
ET(J0,J1,P):IF P<>3 THEN 240
250 PE=PEEK(65280):IF PE=125 OR
PE=253 THEN PAINT(J0,J1),4,2:GOS
UB 270 ELSE 240
260 GOTO200
270 RESTORE:FOR A=1 TO 32
280 READ B,C:D(A)=PPOINT(B,C):NE
XT A
290 ' CHECK FOR CIRCLES
300 FOR E=0 TO 24 STEP 8:FOR A=1
 TO 5:AL=D(A+E)+D(A+1+E)+D(A+2+E
)+D(A+3+E)
310 IF AL=4 THEN GOTO 520 ELSE I
F AL=16 THEN 530
320 NEXT A,E
330 FOR E=0 TO 24 STEP 8
340 AL=D(6+E)+D(7+E)+D(8+E)+D(1+
E):IF AL=4 THEN GOTO 520 ELSE IF
 AL=16 THEN GOTO 530
350 AL=D(7+E)+D(8+E)+D(1+E)+D(2+
E):IF AL=4 THEN GOTO 520 ELSE IF
 AL=16 THEN GOTO 530
360 AL=D(8+E)+D(1+E)+D(2+E)+D(3+
E):IF AL=4 THEN GOTO 520 ELSE IF
 AL=16 THEN GOTO 530
370 NEXT E
380 'CHECK FOR LINES
390 FOR A=1 TO 8
400 AL=D(A)+D(A+8)+D(A+16)+D(A+2
4):IF AL=4 THEN GOTO 520ELSE IF
AL=16 THEN GOTO530
410 NEXT A
420 FOR A=9 TO 12
430 AL=D(A)+D(A+8)+D(A+16)+D(A+2
0):IF AL=4 THEN GOTO 520 ELSE IF
 AL=16 THEN GOTO 530
440 NEXT A
450 FOR A=13 TO 16
460 AL=D(A)+D(A+8)+D(A+16)+D(A+1
2):IF AL=4 THEN GOTO 520 ELSE IF
 AL=16 THEN GOTO 530
470 NEXT A
480 FOR A=17 TO 20
490 AL=D(A)+D(A+8)+D(A+12)+D(A+4
):IF AL=4 THEN GOTO 520 ELSE IF
AL=16 THEN GOTO 530
500 NEXT A
510 RETURN
520 GOSUB580:CLS:SCREEN0,0:PRINT
:PRINTRP$;" WINS":RP=RP+1:JW=0:G
OTO 540
530 GOSUB580:CLS:SCREEN0,0:PRINT
:PRINTLP$;" WINS":LP=LP+1:JW=1:G
OTO 540
540 PRINT:PRINT"TOTAL":PRINT:PRI
NTLP$,LP:PRINTRP$,RP
550 PRINT:PRINT"PRESS <ENTER> TO
 CONTINUE"
560 IF INKEY$=CHR$(13) THEN 70 E
LSE 560
570 CLS:SCREEN0,0:PRINT:PRINT"NO
 WINNER":FORT=1TO800:NEXTT:GOTO7
0
580 FOR T=1TO10:SCREEN1,1:FORTI=
1TO20:NEXTTI:SCREEN1,0:FORTI=1TO
20:NEXTTI,T
590 PE=PEEK(65280)
600 IF PE=124 OR PE=252 THEN RET
URN ELSE 590
```

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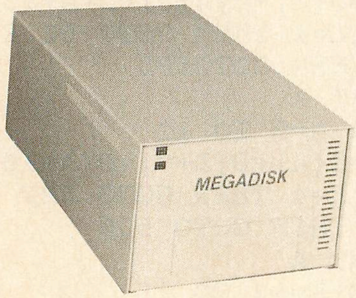

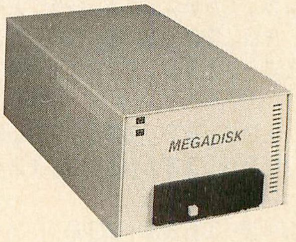

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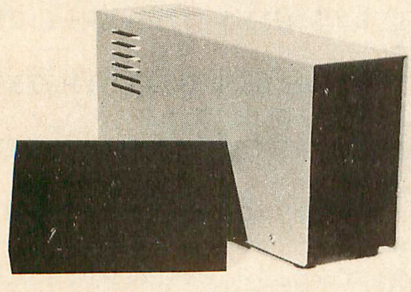

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An educational game to encourage mastery of word concepts

Which Nym Is Witch?

By Brien Dick

When the first CoCos arrived in our school I was thrilled. However, the software we ordered hadn't arrived and the class needed something to use. This was the perfect opportunity for me to learn BASIC. It was one of my fourth-graders, Jody Eason, who came up with the idea to make a program like the matching games they played in class. *Nymatch* was born.

Matching games are popular learning tools. Drill and practice becomes fun. The cards are placed face down. Pick two cards and, if they match, you keep them and go again. The winner is the one with the most sets. Add the CoCo and you have an automatic answer checker.

Nymatch can be used in any subject. All you need are two ideas that share a relationship. In history one such pair could be Washington and first President. In math it could be 5+5 and 10. For my subject I chose reading. More specifically, Nyms. What are Nyms? I use Nyms as a broad category of words made up of synonyms, antonyms and homonyms. Synonyms are words that have the same meaning (woods/forest). Antonyms are words that have the opposite meaning (hot/cold). Homonyms are more confusing. Homonyms are broken down into two types: homophones and homographs. Homophones are two words that sound alike but are spelled differently (deer/dear). Homographs sound differently, but are written the same. Read can be pronounced reed or red.

Having a firm foundation in word concepts is an important link between reading words and understanding the material. Reading some articles in THE RAINBOW can be frustrating to those unfamiliar with the topic. Understanding what the words mean in the context of the article is essential. One way to strengthen vocabulary is to study how words relate to other words. That is the reason so much time is spent on Nyms in school. That is the goal of *Nymatch.*

Nymatch works on 16K non-Extended BASIC. Just type it in, save and run it. If you own Extended BASIC and get an OM Error, just `PCLEAR 1` before running.

Although the game targets grades three through six, it is valuable for you as a parent to play with your child. Your child may not be able to "sound out" some words. Others may be used in a new way. Your help early on can make a big difference in how fast your child masters the vocabulary in *Nymatch.* Many children at this level are just beginning to learn problem-solving strategies needed in locating matched pairs. For them, the game is reduced to a guessing game. Playing with a parent gives them examples of other strategies.

Table 1

Lines	Function
10- 220	Title and set-up
230- 270	Game loop
360- 530	Record keeping
540- 630	Game subroutine
640- 760	Examples & directions
770-1330	Manipulate choices
1340-1380	Fancy print routine
1390-1430	Border & delay routines
1440-1720	Homonym card set
1730-2020	Antonym card set
2030-2320	Synonym card set

Since this game is so versatile, you can add your own sets of matched pairs. Making changes is not hard. You need only modify two areas; the `DATA` statements and the submenu explaining the

---

Brien Dick lives with his wife and three sons in Rensselaer, Indiana. He has a master's degree in education and teaches fourth grade. His hobbies include writing programs for his sons and the classroom.

nformation. If you have 16K, there is ot enough room to add any games. ou will have to replace any set of cards ith your own sets. Those with more emory can add to *Nymatch.*

Add your game to the main menu in ines 550 to 590. Don't forget to adjust he ON/GOTO line numbers in Line 70. f you are adding more games, change ine 620. Add one to the five for each dded game.

You will need a set of 30 matched pairs for the DATA lines at the end of the program. Each DATA line holds the matched pair and its ID number. Remember that each set of 30 pairs must be in the same order as in the menu.

Final Notes

I hope your child enjoys *Nymatch.* Learning can and should be enjoyable whenever possible. Our CoCo proves that over and over again. Isn't that why most of us bought one in the first place?

Drop me a line if you are using a CoCo in your school. I'd like to hear from you, and I'm willing to help with problems you have. Just send a description of the problem with a listing, if you have a printer.

(You may direct your questions to the author at 112 South Milton, Rensselaer, IN 47978. Please enclose an SASE when writing.) □

230	113	1220	29
450	73	1430	196
640	71	1750	11
750	32	2040	21
1000	157	END	50

The listing: NYMATCH

```
10 'COPYRIGHT 1983 BY BRIEN DICK
20 CLEAR200:CLS3:CO=185:GOSUB139
0
30 DIM W(24,3),C$(24),C(24),P$(2
4),P(4),D(24)
40 TI$="NYMATCH":LO=108:GOSUB135
0
50 TI$="CREATED BY: BRIEN DICK":
LO=294:GOSUB 1350
60 GOSUB1430:GOSUB360:GOTO540
70 ON CH GOTO640,670,700,730
80 GOSUB1390:K=5
90 A$=CHR$(143+((K-1)*16))
100 B$=A$+A$+A$
110 C$=CHR$(175):D$=CHR$(191)
120 E$=CHR$(128)+CHR$(128)+CHR$(
128)
130 FORX=1TO15
140 C1$=C1$+C$:D1$=D1$+D$:NEXTX
150 FOR A=1TO24
160 W(A,1)=28+L+(A*4)
170 W(A,2)=60+L+(A*4)
180 W(A,3)=92+L+(A*4)
190 IF A=8 OR A=16 THEN L=L+96
200 NEXT A
210 IFCH=1THENGOSUB1040ELSEGOSUB
1030
220 LO=419:GOSUB1340:INPUTX:CLS0
230 FORA=1TO24
240 FORB=1TO3
250 PRINT@W(A,B)-32,B$;
260 IFB=1THENPRINT@W(A,B)-32,CHR
$(64+A);
270 NEXTB,A
280 FORPL=1TOP
290 R=0:GOSUB 770:GOSUB 800
300 GOSUB450:GOSUB830:GOSUB770
310 GOSUB800:IFR=1THEN290
320 NEXTPL:GOTO280
330 GOSUB500:CO=185:GOSUB 1390
340 TI$="ANOTHER GAME (Y/N)? ":L
O=422:GOSUB1350
350 Y$=INKEY$:IFY$="Y"THENRUNELS
EIFY$="N"THENCLS:ENDELSE350
360 TI$="HOW MANY PLAYERS (1-4)"
:LO=388:GOSUB1350
370 INPUTP
380 IF P>5THENTI$="too many play
ers":LO=388:GOSUB1350:GOSUB 1430
:GOTO360
390 CLS4:CO=169:GOSUB1390
400 PRINT@96,"";:FORH=1TOP
410 TI$="WHO IS PLAYER #"+STR$(H
):LO=32*H:GOSUB1350
420 INPUT P$(H)
430 IFLEN(P$(H))>15THENPRINT"ple
ase shorten your name";:GOTO420
440 NEXTH:RETURN
450 PRINT@398-INT(LEN(P$(PL))/2)
," "P$(PL)" ";
460 PRINT@451,"PRESS <SPACEBAR>
TO PLAY";
470 T$="":T$=INKEY$
480 IFT$<>" "THEN470
490 GOSUB770:GOSUB800:RETURN
500 CLS3:GOSUB1390:TI$="scoreboa
rd":LO=75:GOSUB1350
510 FORH=1TOP:LO=73+(64*H):TI$=S
TR$(P(H))+"  "+P$(H):GOSUB1350:N
EXTH
520 GOSUB1430:RETURN
530 P(PL)=P(PL)+2:R=1:RETURN
540 CO=42:CLS2:GOSUB1390
550 TI$="WHICH GAME DO YOU WANT"
:LO=133:GOSUB1350
560 PRINT@ 234,"HOMONYM  (1)";
570 PRINT@ 298,"ANTONYM  (2)";
580 PRINT@ 362,"SYNONYM  (3)";
590 PRINT@423,"DIRECTIONS  (4)";
600 PRINT@155,"?";
610 CH$=INKEY$:C=C-1:IFCH$=""THE
N610
620 IFVAL(CH$)>0 AND VAL(CH$)<5T
```

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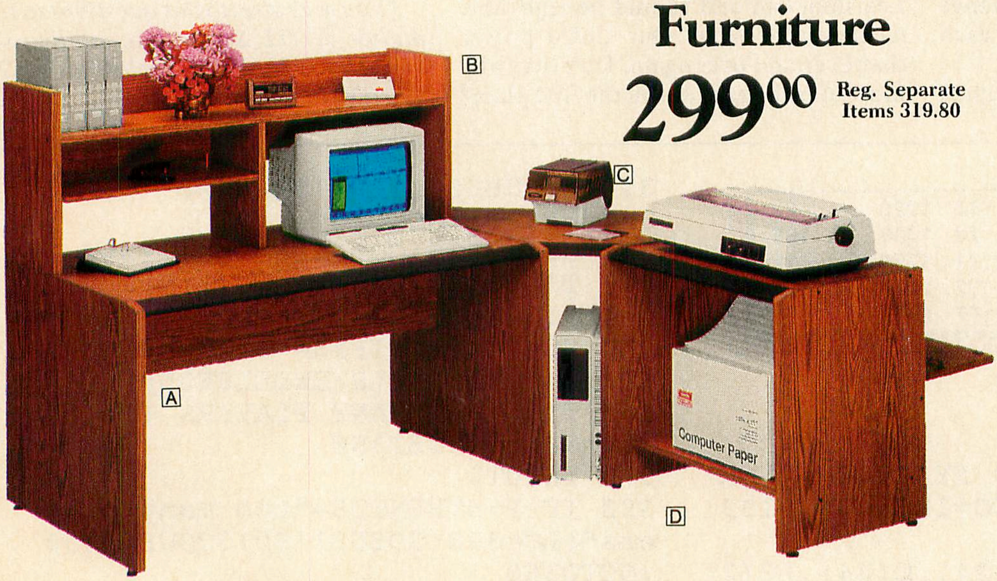

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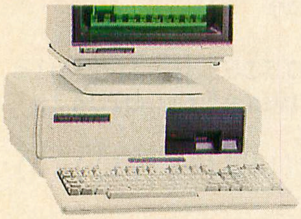

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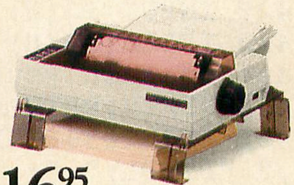

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9½ × 11"	1	Greenbar	Yes	3500	26-1403	49.95
9½ × 11"	1	White	Yes	500	26-1423	8.95
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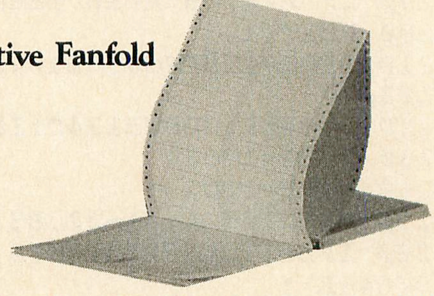

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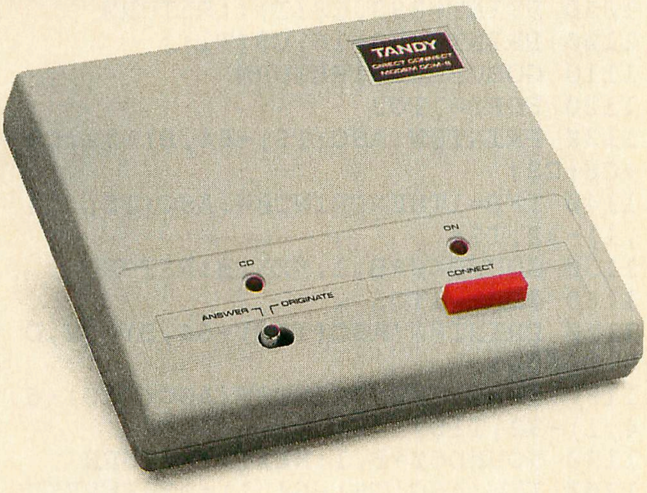

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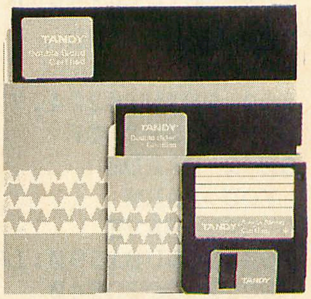

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```
HEN CH=VAL(CH$)ELSE540
630 X=RND(C):GOTO70
640 CLS:PRINT@70,"homophone matc
h up";
650 PRINT@131,"HOMOPHONES ARE WO
RDS THAT        SOUND THE SAME A
ND HAVE         DIFFERENT SPELLIN
GS.";
660 PRINT@259,"samples: SENT/CEN
T                       BYE/BY";
:GOTO80
670 CLS:PRINT@70,"antonym match
up";
680 PRINT@131,"ANTONYMS ARE WORD
S WITH          OPPOSITE MEANINGS
.";
690 PRINT@259,"samples: WALK/RUN
                        SAME/DIF
FERENT";:GOTO80
700 CLS:PRINT@70,"synonym match
up";
710 PRINT@131,"SYNONYMS ARE WORD
S WITH          THE SAME MEANINGS
.";
720 PRINT@259,"samples: LEAVE/GO
                        ALL/EVER
Y";:GOTO80
730 CLS5:PRINT@75,"directions";
740 PRINT@128,"   NYMATCH IS A W
ORD GAME AND      A MEMORY GAME
IN ONE."
750 PRINT@224,"   YOU WILL BE GI
VEN A SET OF      24 CARDS. CHOO
SE 2 CARDS        THAT MATCH AND
 YOU EARN         THOSE CARDS AN
D MAY HAVE        ANOTHER TURN."
760 GOSUB1390:LO=453:GOSUB1340:I
NPUTX:GOTO540
770 FORX=0TO4
780 PRINT@352+(X*32),C1$;CHR$(12
8);
790 NEXTX:RETURN
800 FOR X=0TO4
810 PRINT@352+16+(X*32),D1$;
820 NEXTX:RETURN
830 T$="":T$=INKEY$
840 PRINT@421,"1ST CARD";
850 IFT$=""THEN830
860 IFASC(T$)<65ORASC(T$)>88THEN
830
870 GOSUB980
880 IFW(ASC(T$)-64,1)=0THEN830
890 GOSUB770:GOSUB1120:GOSUB1090
900 T1$="":T1$=INKEY$
910 PRINT@437,"2ND CARD";
920 IFT1$=""THEN900
930 IFASC(T1$)<65ORASC(T1$)>88TH
EN900
940 IFASC(T$)=ASC(T1$)THEN900
950 IFW(ASC(T1$)-64,1)=0THEN900
960 GOSUB1160:GOSUB800
970 GOSUB990:GOSUB1200:RETURN
980 T=ASC(T$)-64:RETURN
990 T1=ASC(T1$)-64:GOSUB1100
1000 IFC(T)=C(T1)THENGOSUB530
1010 IFC(T)=C(T1)THENGOSUB1270
1020 RETURN
1030 FORX=1TO30*(CH-1):READZ$,Z,
Y$,Y:NEXTX
1040 J=RND(18):IFJ=1THEN1050ELSE
FORX=1TOJ*4:READJ$:NEXTX
1050 FORF=1TO24
1060 J=RND(24)
1070 IFD(J)=1THEN1060ELSED(J)=1
1080 READC$(J):READ C(J):NEXT:RE
TURN
1090 PRINT@388,C$(T);:RETURN
1100 PRINT@388+16,C$(T1);
1110 GOSUB1430:RETURN
1120 FORB=1TO3
1130 PRINT@W(ASC(T$)-64,B)-32,C$
+C$+C$;
1140 IFB=1THENPRINT@W(ASC(T$)-64
,1)-32,T$;
1150 SOUND60*B,1:NEXTB:RETURN
1160 FORB=1TO3
1170 PRINT@W(ASC(T1$)-64,B)-32,D
$+D$+D$;
1180 IFB=1THENPRINT@W(ASC(T1$)-6
4,1)-32,T1$;
1190 SOUND60*B,1:NEXTB:RETURN
1200 IFW(ASC(T$)-64,1)=0THENRETU
RN
1210 FORB=1TO3
1220 PRINT@W(ASC(T$)-64,B)-32,B$
;
1230 IFB=1THENPRINT@W(ASC(T$)-64
,1)-32,T$;
1240 PRINT@W(ASC(T1$)-64,B)-32,B
$;
1250 IFB=1THENPRINT@W(ASC(T1$)-6
4,B)-32,T1$;
1260 NEXTB:RETURN
1270 FORB=1TO3
1280 SOUND INT(50/B),1
```

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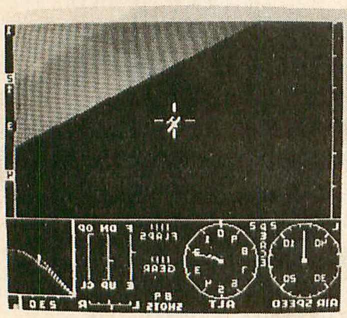
```
1290 PRINT@W(T,B)-32,E$;
1300 PRINT@W(T1,B)-32,E$;
1310 W(T,B)=0:W(T1,B)=0:NEXTB
1320 X1=X1+1:IFX1=12THEN330
1330 GOSUB1430:RETURN
1340 TI$="PRESS <ENTER> TO PLAY"
1350 FORX=1TOLEN(TI$)
1360 PRINT@LO,LEFT$(TI$,X);
1370 SOUND100+(X*2),1
1380 NEXT:RETURN
1390 FORX=1024TO1055:POKEX,CO:NE
XT
1400 FORX=1024TO1504STEP32:POKE
X,CO:NEXT
1410 FORX=1504TO1535:POKEX,CO:NE
XT
1420 FORX=1055TO1535STEP32:POKEX
,CO:NEXT:RETURN
1430 FORD=1TO1400:NEXT:RETURN
1440 DATA FOUR,1,FOR,1
1450 DATA ATE,2,EIGHT,2
1460 DATA EYE,3,I,3
1470 DATA BARE,4,BEAR,4
1480 DATA DEAR,6,DEER,6
1490 DATA DAYS,7,DAZE,7
1500 DATA CITE,8,SITE,8
1510 DATA CHORD,9,CORD,9
1520 DATA CENT,10,SENT,10
1530 DATA AUNT,11,ANT,11
1540 DATA BLEW,12,BLUE,12
1550 DATA AIR,13,HEIR,13
1560 DATA DEW,14,DO,14
1570 DATA DOE,15,DOUGH,15
1580 DATA HAIR,16,HARE,16
1590 DATA GRATE,17,GREAT,17
1600 DATA HAIL,18,HALE,18
1610 DATA NEW,19,KNEW,19
1620 DATA HAY,20,HEY,20
1630 DATA CREEK,21,CREAK,21
1640 DATA KNIGHT,22,NIGHT,22
1650 DATA KNOT,23,NOT,23
1660 DATA SON,24,SUN,24
1670 DATA STEAK,25,STAKE,25
1680 DATA SEW,26,SOW,26
1690 DATA SHOOT,27,CHUTE,27
1700 DATA SCENE,28,SEEN,28
1710 DATA RIGHT,29, WRITE,29
1720 DATA ROTE,30,WROTE,30
1730 DATA POOR,1,RICH,1
1740 DATA RARE,2,COMMON,2
1750 DATA QUIT,3,CONTINUE,3
1760 DATA PROPER,4,IMPROPER,4
1770 DATA SAME,5,DIFFERENT,5
1780 DATA SAFE,6,DANGEROUS,6
1790 DATA ILL,7,HEALTHY,7
1800 DATA POWERFUL,8,WEAK,8
1810 DATA PROUD,9,ASHAMED,9
1820 DATA FILL,10,EMPTY,10
1830 DATA UNITE,11,DIVIDE,11
1840 DATA GATHER,12,SCATTER,12
1850 DATA CRUEL,13,KIND,13
1860 DATA EVIL,14,GOOD,14
1870 DATA ASLEEP,15,AWAKE,15
1880 DATA REPAIR,16,DESTROY,16
1890 DATA RAPID,17,SLOW,17
1900 DATA POLITE,18,RUDE,18
1910 DATA QUESTION,19,ANSWER,19
1920 DATA NONE,20,SOME,20
1930 DATA YOUTHFUL,21,OLD,21
1940 DATA BALD,22,HAIRY,22
1950 DATA AVERAGE,23,UNUSUAL,23
1960 DATA CHEAP,24,EXPENSIVE,24
1970 DATA BEFORE,25,AFTER,25
1980 DATA BRIEF,26,LONG,26
1990 DATA FALSE,27,TRUE,27
2000 DATA DOUBT,28,BELIEVE,28
2010 DATA DIRTY,29,CLEAN,29
2020 DATA LIGHT,30,DARK,30
2030 DATA KILL,1,MURDER,1
2040 DATA LIKE,2,ENJOY,2
2050 DATA LITTLE,3,TINY,3
2060 DATA MEAN,4,UNKIND,4
2070 DATA NEAR,5,CLOSE,5
2080 DATA MIX,6,BLEND,6
2090 DATA SLEEP,7,DOZE,7
2100 DATA REAL,8,TRUE,8
2110 DATA SECRET,9,HIDDEN,9
2120 DATA SICK,10,ILL,10
2130 DATA EXCITED,11,THRILLED,11
2140 DATA ZERO,12,NONE,12
2150 DATA TOTAL,13,WHOLE,13
2160 DATA TOUGH,14,HARD,14
2170 DATA USUAL,15,REGULAR,15
2180 DATA COUCH,16,SOFA,16
2190 DATA HAPPY,17,GLAD,17
2200 DATA HEAL,18,CURE,18
2210 DATA DEPART,19,LEAVE,19
2220 DATA DAMAGE,20,RUIN,20
2230 DATA FAKE,21,FALSE,21
2240 DATA EASY,22,SIMPLE,22
2250 DATA ADORE,23,LOVE,23
2260 DATA CLOSE,24,SHUT,24
2270 DATA BATTLE,25,FIGHT,25
2280 DATA HARD,26,ROUGH,26
2290 DATA FAST,27,SWIFT,27
2300 DATA DRAG,28,PULL,28
2310 DATA CONFESS,29,ADMIT,29
2320 DATA FIX,30,REPAIR,30
```

TOM MIX'S MINI-CATALOG



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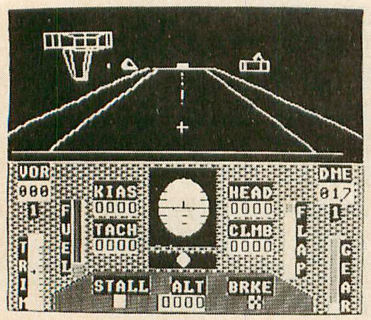

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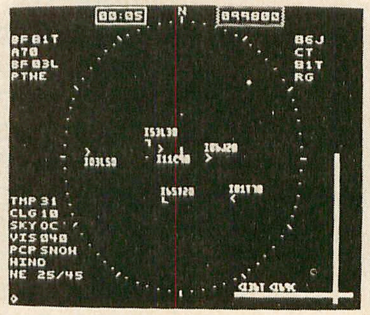

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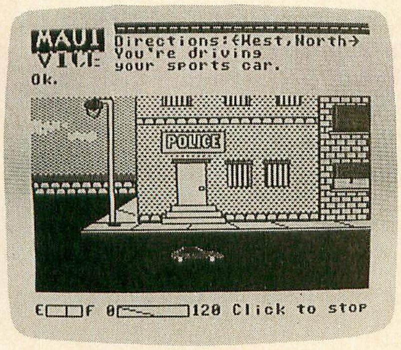

```
MAUI  Directions:<West,North>
VICE: You're driving
      your sports car.
Ok.
```

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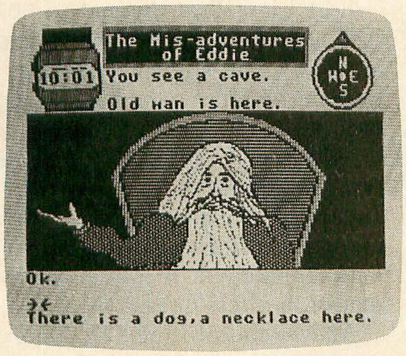

```
The Mis-adventures
of Eddie
10:01  You see a cave.
       Old man is here.
Ok.
><
There is a dog, a necklace here.
```

The Misadventures of Eddie

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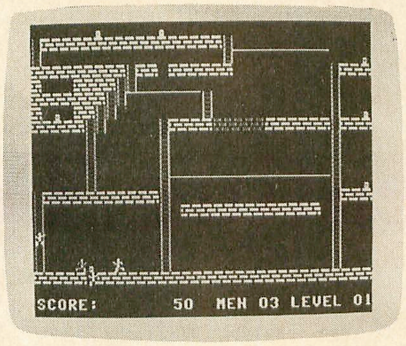
Requires 64K
Disk $21.95



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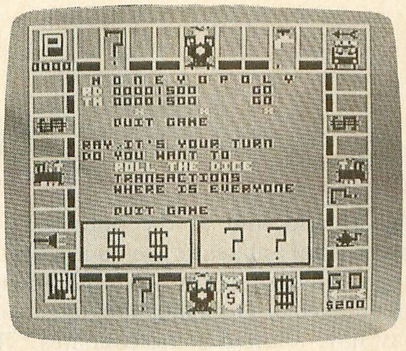

```
M O N E Y O P O L Y
RD 00001500      GO
TR 00001500      GO

   QUIT GAME

RAY,IT'S YOUR TURN
DO YOU WANT TO
   ROLL THE DICE
   TRANSACTIONS
   WHERE IS EVERYONE

   QUIT GAME
```

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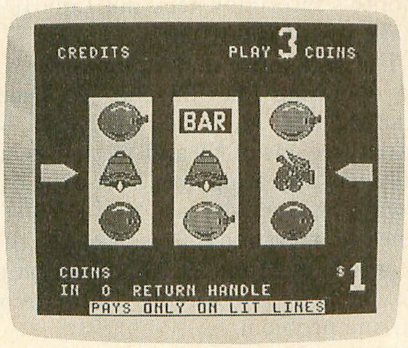

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TAKING BASIC TRAINING

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Part two of the translation demonstration

Uncomplicating Translating

By Joseph Kolar
Rainbow Contributing Editor

Before we dive in and immerse ourselves in the nitty-gritty of the second part of our translation demo, I would like to make a few observations.

We have gone from the germination of an idea and, step by step, added to it to broaden its scope. As a newcomer to CoColand, you have helped construct a program that is well within your capabilities. There was no earth-shattering concept to grasp. But, don't expect to produce a viable program in a day or two. You will find gremlins lurking around and thwarting your efforts every step of the way. No matter. If you attend to the problem at hand and solve it at every stage of the process, you will have a usable, if not useful, program.

Did you notice that as you created this program, you had fun working out each segment? In spite of yourself, you began to associate the Romanian words with their English mates. Not only were you brushing up on your typing and programming skills, but you were becoming familiar with the subject matter.

Florida-based Joseph Kolar is a veteran writer and programmer and specializes in introducing beginners to the powers of CoCo.

This should hint at the potential for educational applications you are beginning to unleash. If you are familiar with a Romance or Germanic language, you may have spotted some cognates. The perceptive programmer might wonder if "raft" meaning "shelf," figuratively a plank, is not related to "raft," a platform for swimming, not to mention a roofing rafter.

Did you save your work on tape? `CLOAD` it. If not, copy Listing 1 from last month's tutorial. Check out Line 10 to make sure it is `GOTO20`.

Did you notice that, at times, we had no operating lines 22 and 32? Delete lines 22 and 32, then run. Again, we have three sets of X$ and Y$ strings and only one operating line, Line 42. CoCo always chooses the last X$ or Y$ sentence to operate on. Press BREAK, then restore lines 22 and 32. This observation may be helpful in solving another reoccurring problem.

Key in, from this month's Listing 1, lines 8, 50, 51 and 52. Line 8 prints both sentences without an intervening pause. List lines 50 through 52. Line 51 is a word-by-word literal translation of Line 50. Note, for the first time in our demo, that the sentence in Line 51 extended to the second text line. The invisible-vertical-line gambit is alive and well. Line 52 depicts the usual English translation.

Edit Line 10 at the end to `GOTO50`. Add at end of Line 5 `:GOSUB5` and run. We allow the student/viewer to look over the sentence to be translated. Press BREAK.

Add at end of Line 51 `:GOSUB8` and run. We display both the foreign sentence and word-by-word translation merely for informational purposes. Unfortunately, it is a tortured English rendition. Press BREAK.

Add at end of Line 52 `:GOSUB3` and run. This displays the two sentences we intend to dissect.

You can devise your own system. This segment is included to give some ideas as to how to approach problems of this nature. You might revise `GOSUB3` so both languages are put on simultaneously to display lines 50 and 52. You can also deep-six `GOSUB`s you do not intend to use.

List lines 50 and 52. We decide to break them into two parts. The most practical break is after "George." Count directly from the screen to get the 'P' and 'Q' values. Key in `53 P=12:Q=9:` Do not press ENTER yet. Recall that if the next to last segment of a divided sentence is put on using `GOSUB2`, you can use `GOSUB4` instead. Type `GOSUB4` nd press ENTER. Run the program then ress BREAK.

Change Line 10 to `10 CLSZ:GOTO60`. Key in lines 60 and 61. Press BREAK and List Line 60. Note that each succeeding text line begins under the opening quote mark. You may also divide a word if necessary. The lines look odd because in Line 60 there are no spaces between words. This is because the words end at the right margin, and the left margin of the next row follows immediately. List Line 61. You can easily spot the invisible vertical line. This is because blank spaces were used to fill in the empty space up to the right margin so that the next words would start a new row at the left margin.

Key in `63 GOSUB3`. This is a temporary use of `GOSUB3` to display lines 60 and 61 in their entirety. It is good practice to double-check long strings for correct spelling and formatting before proceeding. Run the program. The strings X$ and Y$ abut. It doesn't look good. One solution is to drop Y$ two rows or 64 characters/spaces at the beginning of the operating line, Line 62. We want to move 'Y' location down by 64 spaces. Insert `Y=Y+64:` at the beginning. Run, then press BREAK then CLEAR. List lines 60 and 61.

Our first part will end with the space after '$' and ',' respectively. Count directly from the screen to determine the first set of values, P=24 and Q=27.

Rekey Line 62 to read `62 Y=Y+64:P=24:Q=27:GOSUB2:`. Press ENTER. Run and press BREAK, then CLEAR. List lines 60 and 61. Edit Line 62 and enter `X`.

The next part will end with "urc@" at space 31 and "ascended" at space 38. Add `P=31:Q=38:GOSUB2:`. Press ENTER. Run and press BREAK, then CLEAR. List lines 60 and 61. Edit Line 62 and enter `X`.

The next part, "pe tronul" ends at 41 and "the throne" at 52. You can pick up the count either beginning at 32, a known signpost at the start of text row two, or pick up the last 'P' or 'Q' value. You know that "ascended" ended at Q=38. By looking at Line 62, start tapping away with "TO---", T=39, O=40, space=41, etc., to the next division. Enter `P=41:Q=52:GOSUB2:`. Press ENTER and run it. Press BREAK, then CLEAR. Edit Line 62 and enter `X`.

The next portion ends at the space after "romaneshti." Pick up the last 'P' value from Line 62 and count off. 'P' will equal 57. The 'Q' value ends after "wallachia."

Look at Line 61. Note that "wallachia" extends across the invisible vertical line. We know that 'C' is at number 64, so pick up the count from that point. It ends at 68. Enter `P=57:Q=68:GOSUB2:`. Press ENTER and run it. Press BREAK and CLEAR. List lines 60 and 61. Edit line 62 and enter `X`.

The next part ends in both X$ and Y$ after "1436." You can begin calculating 'P' from number 64 and you can pick up the 'Q' starting number from the last 'Q' value, 68. Determine the values.

Enter `P=71:Q=85:GOSUB2:`. Press ENTER and run it. Press BREAK and CLEAR. List lines 60 and 61. Edit Line 62 and enter `X`.

> ***"This mistake may lie dormant while you are creating the program, but after you finalize it, it pops up to haunt you."***

The next 'P' section ends after "incerc@." Pick up the count from the last 'P' value in Line 62 (71) and count. The next 'Q' value is the last word of the text line "and tried." We know the next line begins with number 96, so we subtract one to get to the right margin of the previous line to get 'Q'.

Enter `P=82:Q=95:GOSUB2:`. Press ENTER and run it. Press BREAK and CLEAR. List lines 60 and 61. Edit Line 62 and press ENTER. This time we won't 'X' to the end. This would cause Line 60 to scroll up and off the screen, losing our place. First, we will determine our next break, which ends after "scape," picking up the count from Line 62. Now, we can type `X` and `P=91:`. Do not press ENTER! The English equivalent is "to free." We pick up the count by counting down from the opening quote, 0, 32, 64, 96 and start counting. Add `Q=103:GOSUB2:`. Press ENTER and run it. Press BREAK and CLEAR. List lines 60 and 61. Edit Line 62 and press ENTER. We have one more break to do. Be on the alert because, after we get our next 'P' and 'Q' values, we add `GOSUB4` instead of `GOSUB2`, then we'll be finished.

The last break is "tsara," which ends

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just before our invisible vertical line and therefore must be 95. Type `X` and `P=95:`. The last mate is "the country" and we pick up 'Q' from Line 62 and count. Type `Q=115:GOSUB4`, press ENTER and run. Whew!

It is suggested that you advance from division to division until you feel comfortable with this system. Once you get it under your belt, you can figure out the operating line completely before you check it out.

Did you notice the need to use CLEAR when working on a long text line?

Let's consider the case of differing word order between languages.

Type `10 CLSZ:GOTO80`. Key in lines 7, 70 and 71. List lines 70 and 71. "Om" means "man" and "crud" means "cruel." If we choose to break after "om," we find the word "man" is further in the sentence and we have a new problem: to pluck out "man" without "the cruel." We must use a new stratagem to produce parallel definitions.

We could chicken out and make the break end after "crud" and "man" respectively, but we won't.

Look at Line 7. This `GOSUB` allows us to display X$ as usual. We use `MID$` to pull out the word we want and display it first. `MID$(Y$,Q,R)` tells us that from a specified point, 'Q', in the body, `MID$`, of sentence Y$, we want to display 'R' characters/spaces.

First, recall that we pushed down Line 61 64 spaces to `Y+64`. Since we are returning to a normal line, we must return 'Y' to its usual value. We must begin Line 72 with either `Y=Y-64` or `Y=225`. Otherwise, as we add numerous program segments, some of which will be overly long text lines, Y$ will be displayed lower and lower and eventually drift completely off the screen, due to a cumulative error.

This mistake may lie dormant while you are creating the program, but after you finalize it, it pops up to haunt you.

Back to work! We determine the value of 'P', 5. Type `72 Y=225:P=5:`. Do not press ENTER yet. Note the following procedure carefully: The word we want to appear first is "man" with its leading and following blank spaces (for aesthetic reasons). Since it is in the body of the sentence we must determine the values of `MID$(Y$,Q,R)`.

We count on the screen from the invisible vertical line, the number of spaces up to and including the last letter of the word in front of the word we are targeting. It is the 'L' in "cruel," 11 spaces. This is our offset 'Y' value, Y=Y+11. Add `Y=Y+11:`. 'Q' is always one number higher than the offset 11. Add `Q=12:`. To figure out 'R', count, starting at 'Q', the number of spaces to be displayed (six). Add `R=6:`. To activate `MID$(Y$,12,6)`, we tack on `GOSUB7:` and press ENTER. Run it, press BREAK and list lines 70 and 71. Edit Line 72 and enter `X`.

We must return to the beginning of Y$ to display "the cruel." We reduce 'Y' by the amount of the offset, 11. Add `Y=Y-11:`. We are ready to work up the next word(s). The break in X$ is the space after "crud," whose 'P' value is 11. There are a variety of ways to pick up 'Q'. To be safe, count from the starting quote up to and including the space after "cruel" (even though this last space is already displayed), Q=12. Type `P=11:Q=12:GOSUB2:`. Press ENTER and run.

The next division is after "ishi" and "himself." Press BREAK and list lines 70 and 71. Edit Line 72 and enter `X`. Type `P=15:Q=26:GOSUB2:` and press ENTER. Run it and press BREAK. List lines 70 and 71. Edit Line 72 and enter `X`.

Next, we will break after "ucise" and

Listing 1: `LANGTUT1`

```
0 'LISTING1
1 X=97:Y=225:Z=RND(7)+1:IF Z=6 G
OTO1 ELSE GOTO10
2 PRINT@X,LEFT$(X$,P);:EXEC44539
:PRINT@Y,LEFT$(Y$,Q);:EXEC44539:
RETURN
3 P=159:Q=159:PRINT@X,LEFT$(X$,P
);:EXEC44539:PRINT@Y,LEFT$(Y$,Q)
;:Z=RND(7)+1:EXEC44539:CLSZ:RETU
RN
4 GOSUB2:GOSUB3:RETURN
5 P=159:PRINT@X,LEFT$(X$,P);:EXE
C44539:CLSZ:RETURN
7 PRINT@X,LEFT$(X$,P);:EXEC44539
:PRINT@Y,MID$(Y$,Q,R);:EXEC44539
:RETURN
8 P=159:Q=P:PRINT@X,LEFT$(X$,P);
:PRINT@Y,LEFT$(Y$,Q);:EXEC44539:
CLSZ:RETURN
10 CLSZ:GOTO20
20 X$="  CEI CARE ASCULT@ 'NVA^@
. "
21 Y$="  THOSE WHO LISTEN LEARN.
 "
22 GOSUB3
30 X$="  PUN O CARTE PE UN RAFT.
 "
```

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"killed." Type `P=21:Q=34:GOSUB2:`. Note that we pick up 'Q' at number 32, the invisible vertical line. We won't run this one.

We decide to put on "dushmanii" and "the enemy" next. The phrase, "f@r@ mil@" and "without pity" will be put on as a unit. That being our plan, we are alert to the fact that we are calculating the next to last 'P' and 'Q' values. We know that "dushmanii" is the last word on the row, so we use the right margin number, 31, or P=31. We pick up our count from the last 'Q' value in Line 72 and count it out, 44. Type `P=31:Q=44:GOSUB4`. Press ENTER and run.

Checking out our handiwork, I see that we could have placed parentheses around "himself" because we don't usually use the reflexive pronoun in this context. You may want to alter Line 71 to do so. Be warned, some of your 'Q' values will have to be revised. In fact, you should be eager to work it out. Refer to Listing 2, lines 71 and 72 to see if you got the same answer. It is not necessary to copy this listing.

That was the good news. Now, here is the bad news. Lines 70 through 72 present another problem that I neatly side-stepped.

From Listing 2, list lines 70 and 71. Key in the lines as lines 80 and 81. Now list 80 and 81. Aside from the fact that the word order is different, the equivalent of "om" is "the man," not "man." This is a split-section. This creates a new problem that occurs frequently in German verbs. Note the sentence "Ich mache das fenster zu" where "zumachen," meaning "to shut," is split — "mache---zu."

The definite article is separated from the noun in Line 81. Rather than work out both the inverted word order and the split-section at the same time, we solved one problem, and now we'll try both.

Key in Line 9. This `GOSUB` displays X$ up to the break; Y$, to the first break at 'Q'; then it skips to a second location (Y+A+1) and pulls the balance out of the body of the sentence.

`GOSUB9` handles the split-section in the second language. If you need it for the first language, your project is to modify this line. If you can't dream up a demo sentence to check it out, then make the contents of Line 80 Y$ and X$ in Line 81.

The 'P' value of "om" is five. The 'Q' value of "the" is six. Count to the last letter of the last word in front of the target "man," 11, which is 'A'. 'B' is always the next space. B=12 and 'R' is the number of spaces to be displayed, six.

Type `82 P=5:Q=6:A=11:B=12:R=6:GOSUB9`, press ENTER. Run it and press BREAK.

Figure out the next break, "crud"-"cruel," P=11 and Q=12. Edit Line 82, press `X` and ENTER, then type `P=11:Q=12:`. Since we already displayed the various parts in the last segment (lines 70 through 72) let's cut the agony and finish. Type `GOSUB4` and run it.

As usual, there is an easier version of `GOSUB9`, but it is not consistent with our rigid demo format. Lines 100 through 142 contain a few more sentences. They are a bonus for the dedicated programmer to study or work through for practice.

You can delete lines 20 through 142 and use this program as a core to translate sentences in some other language. This program is great for self-study. Crack open a conversational grammar and sharpen your programming skills while painlessly absorbing a foreign vocabulary. ☐

```
31 Y$="  I PUT A BOOK ON A SHELF
. "
32 GOSUB3
40 X$="  NE VOM DUCE M'INE DIMIN
EA^@. "
41 Y$="  WE SHALL GO TOMORROW MO
RNING."
42 P=5:Q=P:GOSUB2:P=9:Q=11:GOSUB
2:P=14:Q=P:GOSUB2:P=20:Q=23:GOSU
B4
50 X$="  PE GEORGE 'L DOARE CAPU
L. ":GOSUB5
51 Y$="  AS FOR GEORGE, HE HURTS
 THE  HEAD. ":GOSUB8
52 Y$="  GEORGE (HE) HAS A HEADA
CHE. ":GOSUB3
53 P=12:Q=9:GOSUB4
60 X$="  DOMNITORUL VLAD ^EPE$ S
E URC@PE TRONUL ^ARII ROM'NE$TI
'N AN-UL 1436 $I 'NCERC@ S@ SCAP
E ^ARADE TURCI. "
61 Y$="  THE RULER, VLAD TSEPESH
, AS- CENDED TO THE THRONE OF WA
LLA-  CHIA IN THE YEAR 1436 AND
TRIED TO FREE THE COUNTRY FROM T
HE    TURKS. "
62 Y=Y+64:P=24:Q=27:GOSUB2:P=31:
Q=38:GOSUB2:P=41:Q=52:GOSUB2:P=5
7:Q=68:GOSUB2:P=71:Q=85:GOSUB2:P
=82:Q=95:GOSUB2:P=91:Q=103:GOSUB
2:P=95:Q=115:GOSUB4
70 X$="  OM CRUD, '$I UCISE DU$M
ANII  F@R@ MIL@. "
71 Y$="  THE CRUEL MAN, HIMSELF,
 KILL-ED THE ENEMY WITHOUT PITY.
 "
72 Y=225:P=5:Y=Y+11:Q=12:R=6:GOS
UB7:Y=Y-11:P=11:Q=12:GOSUB2:P=15
:Q=26:GOSUB2:P=21:Q=34:GOSUB2:P=
31:Q=44:GOSUB4
990 'GOTO990
999 CLSZ:PRINT@10," REPEATING..
";:FOR S=1 TO 1000:NEXT:GOTO20
```

Listing 2: LANGTUT2

```
0 'LISTING2
1 X=97:Y=225:Z=RND(7)+1:IF Z=6 G
OTO1 ELSE GOTO10
2 PRINT@X,LEFT$(X$,P);:EXEC44539
:PRINT@Y,LEFT$(Y$,Q);:EXEC44539:
RETURN
3 P=159:Q=159:PRINT@X,LEFT$(X$,P
);:EXEC44539:PRINT@Y,LEFT$(Y$,Q)
;:Z=RND(7)+1:EXEC44539:CLSZ:RETU
RN
4 GOSUB2:GOSUB3:RETURN
5 P=159:PRINT@X,LEFT$(X$,P);:EXE
C44539:CLSZ:RETURN
7 PRINT@X,LEFT$(X$,P);:EXEC44539
```

```
:PRINT@Y,MID$(Y$,Q,R);:EXEC44539
:RETURN
8 P=159:Q=P:PRINT@X,LEFT$(X$,P);
:PRINT@Y,LEFT$(Y$,Q);:EXEC44539:
CLSZ:RETURN
9 PRINT@X,LEFT$(X$,P);:EXEC44539
:PRINT@Y,LEFT$(Y$,Q);:PRINT@Y+A,
MID$(Y$,B,R);:EXEC44539:RETURN
10 CLSZ:GOTO20
20 X$="  CEI CARE ASCULT@ 'NVA^@
. "
21 Y$="  THOSE WHO LISTEN LEARN.
"
22 GOSUB3
30 X$="  PUN O CARTE PE UN RAFT.
"
31 Y$="  I PUT A BOOK ON A SHELF
. "
32 GOSUB3
40 X$="  NE VOM DUCE M'INE DIMIN
EA^@. "
41 Y$="  WE SHALL GO TOMORROW MO
RNING."
42 P=5:Q=P:GOSUB2:P=9:Q=11:GOSUB
2:P=14:Q=P:GOSUB2:P=20:Q=23:GOSU
B4
50 X$="  PE GEORGE 'L DOARE CAPU
L. ":GOSUB5
51 Y$="  AS FOR GEORGE, HE HURTS
 THE  HEAD. ":GOSUB8
52 Y$="  GEORGE (HE) HAS A HEADA
CHE. ":GOSUB3
53 P=12:Q=9:GOSUB4
60 X$="  DOMNITORUL VLAD ^EPE$ S
E URC@PE TRONUL ^ARII ROM'NE$TI
'N AN-UL 1436 $I 'NCERC@ S@ SCAP
E ^ARADE TURCI. "
61 Y$="  THE RULER, VLAD TSEPESH
, AS- CENDED TO THE THRONE OF WA
LLA-  CHIA IN THE YEAR 1436 AND
TRIED TO FREE THE COUNTRY FROM T
HE    TURKS. "
62 Y=Y+64:P=24:Q=27:GOSUB2:P=31:
Q=38:GOSUB2:P=41:Q=52:GOSUB2:P=5
7:Q=68:GOSUB2:P=71:Q=85:GOSUB2:P
=82:Q=95:GOSUB2:P=91:Q=103:GOSUB
2:P=95:Q=115:GOSUB4
70 X$="  OM CRUD, '$I UCISE DU$M
ANII  F@R@ MIL@. "
71 Y$="  THE CRUEL MAN, (HIMSELF
),    KILLED THE ENEMY WITHOUT P
ITY. "
72 Y=225:P=5:Y=Y+11:Q=12:R=6:GOS
UB7:Y=Y-11:P=11:Q=12:GOSUB2:P=15
:Q=28:GOSUB2:P=21:Q=38:GOSUB2:P=
31:Q=48:GOSUB4
80 X$="  OM CRUD, '$I UCISE DU$M
ANII  F@R@ MIL@. "
```

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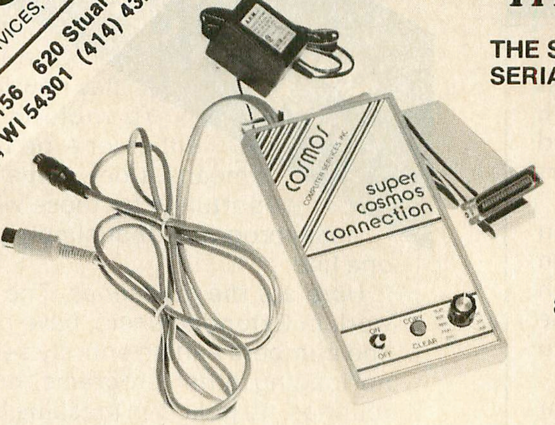

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```
81 Y$="  THE CRUEL MAN, (HIMSELF
),    KILLED THE ENEMY WITHOUT P
ITY. "
82 P=5:Q=6:A=11:B=12:R=6:GOSUB9:
P=11:Q=12:GOSUB4
100 PRINT@5, "THE REST OF THE ST
ORY ";
101 X$="  PE MUL^I 'I ^RASE 'N ^
EAP@. "
102 Y$="  MOST OF THEM, (THEM) H
E IM-  PALED. "
103 P=11:Q=16:GOSUB2:P=14:Q=23:G
OSUB4
110 X$="  DE ACEEA FU PORECLIT V
LAD     ^EPE$ SAU VLAD DRACUL. "
111 Y$="  BECAUSE OF THIS HE WAS
 NICK- NAMED VLAD THE IMPALER OR
 VLAD  THE DEVIL. "
112 P=11:Q=18:GOSUB2:P=14:Q=25:G
OSUB2:P=23:Q=37:GOSUB2:P=37:Q=54
:GOSUB4
120 X$="  MAI T'RZIU, 'N SECOLUL
 XIX,  UN SCRIITOR BRITANIC BRAM
 STOKERSCRISE ROMANUL DRACULA CA
RE SE  PETRECEA 'N TRANSILVANIA.
 "
121 Y$="  MUCH LATER, IN THE 19T
H CEN- TURY, A BRITISH WRITER, B
RAM    STOKER, WROTE THE NOVEL,
'DRA-  CULA', WHICH TOOK PLACE I
N TRAN-SYLVANIA. "
122 Y=Y+64:P=14:Q=P:GOSUB2:P=31:
Q=37:GOSUB2:P=43:Q=39:A=46:B=47:
R=9:GOSUB9:P=52:Q=47:GOSUB2:P=63
:Q=71:GOSUB2:P=70:Q=77:GOSUB2:P=
86:Q=102:GOSUB2:P=91:Q=108:GOSUB
2:P=104:Q=119:GOSUB4
130 X$="  ACEST SCRIITOR C@L@TOR
I 'N   TRANSILVANIA $I AUZI DE V
LAD    DRACUL. "
131 Y$="  THIS WRITER TRAVELED I
N TRAN-SYLVANIA AND HEARD ABOUT
VLAD   THE DEVIL. "
132 Y=225:P=17:Q=14:GOSUB2:P=26:
Q=23:GOSUB2:P=44:Q=40:GOSUB2:P=5
5:Q=56:GOSUB4
140 X$="  DUP@ AL C@RUI NUME ALE
SE     TITLUL ROMANULUI S@U. "
141 Y$="  ACCORDING TO WHOSE NAM
E HE   CHOSE AS THE TITLE OF HIS
 NOVEL."
142 P=7:Q=15:GOSUB2:P=16:Q=21:GO
SUB2:P=21:Q=26:GOSUB2:P=31:Q=37:
GOSUB2:P=38:Q=50:GOSUB2:P=48:Q=5
3:A=56:B=57:R=7:GOSUB9:GOSUB3
990 'GOTO990
999 CLSZ:PRINT@10," REPEATING..
";:FOR S=1 TO 1000:NEXT:GOTO20
```

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About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette) to:

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Is your skill and courage enough to save the Earth from . . .

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The Evil Tyrant Star Lord

By Raju Dash

You are the last hope for your people. Ever since those dreaded aliens arrived, they have caused nothing but destruction. You are in command of the last surface laser cannon. You must use this powerful weapon to destroy the merciless attackers. If you fail, the tyrant Star Lord will enslave your people. It's up to you!

You must position the laser turret and try to hit the attacking alien ship. If the alien ship hits you with one of its bullets, you lose one shield. At the beginning of *Starlord* you have three shields. An indicator in the top right-hand corner of the screen displays the last three shields you have. (It is possible to have more than three shields, but only the last three are indicated.)

The flat land on which your turret moves (the yellow strip of land) protects you from incoming bullets. However, alien ships slowly destroy the earth below as they descend toward the bottom of the screen. If you collide with one of the aliens, you lose a shield. In order to advance to the next skill level, you must destroy one full squadron (16 ships). You are rewarded with a shield.

The screen clears and a new, flickering type of ship starts descending toward the ground. It is important that it be shot before it reaches the ground. If it lands, you will not advance to the next skill level; rather you will have to fight another squadron from the same skill level. The number of ships and the speed of the game increases as the skill level increases.

When you lose all of your shields, the program displays the title screen. At the top of the screen, the high score is displayed, and at the bottom right, the most recent score is shown. At the bottom left is the current skill level. Unless the Reset button is pressed, you continue playing from the skill level on which you died. This way you do not have to repeat the screens you completed before. While the program runs, you may pause execution by pressing the BREAK key. To restart press ENTER.

The program allows either joystick or keyboard input. Simply press 'J' or 'K' from the title screen to make a selection. If you choose the joystick option, use the right joystick to move and the button to fire. For the keyboard option, use the left- and right-arrow keys to move and the space bar to fire.

Raju Dash is a senior at Downers Grove North High School in Illinois. He started programming in BASIC on a 4K Color Computer five years ago and has progressed to programming in assembly language on a 64K CoCo 2.

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After typing in the BASIC loader for *Starlord*, save it to disk or tape. Then perform a cold start on your computer. Type in `POKE 25,57:POKE 14592, 0:NEW` to reserve room for the assembled program. Now `CLOAD` the BASIC loader back into the computer. If you want to save the program as a binary file, delete Line 50. Run the program. In approximately 30 seconds the program will execute. If you deleted Line 50, the computer simply prints `OK` when it is finished poking the data into memory. Now you can save it. Type `CSAVEM"STARLORD",10240,14430,12174` to save the program as a binary file.

Now all you have to do is `CLOADM` and `EXEC`ute to run the program. The program runs on any Color Computer with 32K memory. Since the assembled version will run on a 16K system, the easiest way to load the program would be to make a binary file of it on a 32K system and then load the machine language code on the 16K system. (The BASIC loader takes up a little over 16K.) Another, more tedious method, would be to break the loader up into several short BASIC loaders, each loading a part of the total program. Then, once the entire program has been poked into memory, it can be saved as a binary file. This process is tricky, so be cautious.

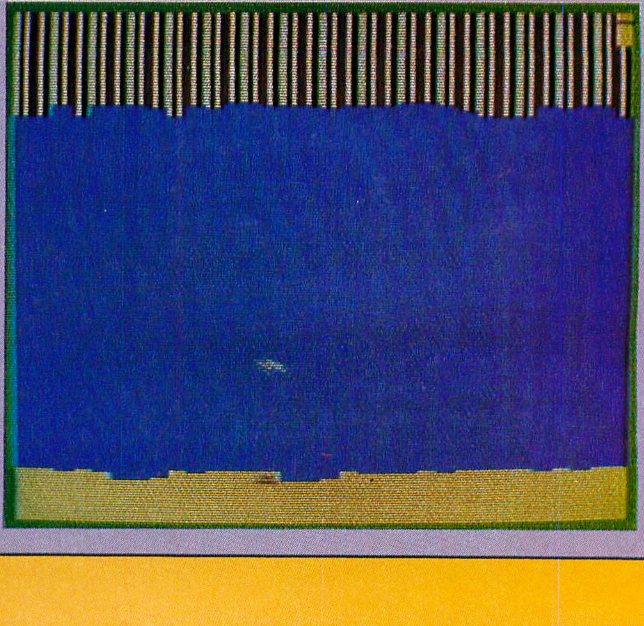
Starlord is a very exciting game particulary at the higher skill levels Here's a tip: A bullet takes longer to hi a ship that is higher up so you must fir in advance of the ship in order to hit it Hitting ships becomes easier at the higher skill levels because the entir game executes faster. I will be happy to answer any questions that may arise Have fun!

(Questions about this program may be directed to Mr. Dash at 1490 Golden Bell Ct., Downers Grove, IL 60515, 312-960-0428. Please enclose an SASE when writing.) □

180	34	1650	76	2830	162	4340	44
370	153	1760	198	2980	5	4490	169
560	161	1850	161	3130	213	4700	1
740	55	1950	0	3280	63	4870	122
870	134	2060	236	3430	126	5020	254
1080	67	2160	126	3590	216	5170	165
1210	33	2260	144	3740	48	END	149
1330	167	2360	152	3890	154		
1430	197	2530	119	4040	115		
1530	234	2680	222	4190	17		

The listing: STARLORD

```
5 '**basic loader for StarLord
7 'be sure to POKE 25,57 before
loading!!
10 FOR I= 10240 TO  14430
20 READ X
30 POKE I,X
40 NEXT I
50 EXEC 12174
60 DATA 32,33,35,37,39,41,43,45
70 DATA 46,48,50,51,53,54,55,57
80 DATA 58,59,60,60,61,62,62,63
90 DATA 63,63,63,63,63,63,62,62
100 DATA 61,60,60,59,58,57,56,55
110 DATA 54,53,51,50,49,48,46,45
120 DATA 44,43,41,40,39,38,37,35
130 DATA 34,33,32,32,31,30,29,29
140 DATA 28,28,28,27,27,27,27,27
150 DATA 27,27,28,28,28,29,29,30
160 DATA 30,31,32,32,33,34,35,36
170 DATA 36,37,38,39,39,40,41,42
180 DATA 42,43,43,44,44,45,45,45
190 DATA 45,45,45,45,45,45,45,45
200 DATA 44,44,43,43,42,41,41,40
210 DATA 39,38,37,36,35,35,34,33
220 DATA 32,30,29,28,28,27,26,25
230 DATA 24,23,22,22,21,20,20,19
240 DATA 19,18,18,18,18,18,18,18
250 DATA 18,18,18,18,19,19,20,20
260 DATA 21,21,22,23,24,24,25,26
270 DATA 27,27,28,29,30,31,31,32
280 DATA 33,33,34,34,35,35,35,36
290 DATA 36,36,36,36,36,36,35,35
300 DATA 35,34,34,33,32,31,31,30
310 DATA 29,28,26,25,24,23,22,20
320 DATA 19,18,17,15,14,13,12,10
330 DATA 9,8,7,6,5,4,3,3
340 DATA 2,1,1,0,0,0,0,0
350 DATA 0,0,1,1,2,3,3,4
360 DATA 5,6,8,9,10,12,13,15
```



```
370 DATA 17,18,20,22,24,26,28,30
380 DATA 32,34,37,39,42,44,46,48
390 DATA 50,52,54,56,57,59,60,61
400 DATA 62,62,63,63,63,63,63,62
410 DATA 62,61,60,59,58,57,56,55
420 DATA 54,52,51,50,48,47,46,44
430 DATA 43,42,41,40,39,38,38,37
440 DATA 36,36,36,35,35,35,35,35
450 DATA 35,35,35,35,35,35,35,36
460 DATA 36,36,36,36,36,37,37,37
470 DATA 37,37,37,37,37,37,36,36
480 DATA 36,36,36,36,36,35,35,35
490 DATA 35,35,35,34,34,34,34,34
500 DATA 34,34,34,34,34,34,34,34
510 DATA 34,34,34,34,34,34,34,34
520 DATA 34,34,34,34,34,34,34,34
530 DATA 33,33,33,33,33,32,32,32
540 DATA 32,31,31,31,30,30,30,30
550 DATA 30,29,29,29,29,29,29,29
560 DATA 29,29,29,29,29,29,29,29
570 DATA 29,29,29,29,29,29,29,29
580 DATA 29,29,29,29,29,29,28,28
590 DATA 28,28,28,28,27,27,27,27
600 DATA 27,27,27,26,26,26,26,26
610 DATA 26,26,26,26,27,27,27,27
620 DATA 27,27,28,28,28,28,28,28
630 DATA 28,28,28,28,28,28,27,27
640 DATA 27,26,25,25,24,23,22,21
650 DATA 20,19,17,16,15,13,12,11
660 DATA 9,8,7,6,5,4,3,2
670 DATA 1,1,0,0,0,0,0,1
680 DATA 1,2,3,4,6,7,9,11
690 DATA 13,15,17,19,21,24,26,29
700 DATA 32,33,34,35,36,37,39,40
710 DATA 41,42,43,44,45,46,47,48
720 DATA 49,50,51,52,53,54,55,56
730 DATA 56,57,58,58,59,59,60,60
740 DATA 61,61,62,62,62,62,63,63
750 DATA 63,63,63,63,63,63,63,63
760 DATA 62,62,62,62,61,61,61,60
770 DATA 60,59,59,58,58,57,57,56
780 DATA 56,55,54,54,53,52,52,51
790 DATA 50,50,49,48,48,47,46,46
800 DATA 45,44,44,43,42,42,41,41
810 DATA 40,39,39,38,38,37,37,37
820 DATA 36,36,35,35,35,34,34,34
830 DATA 33,33,33,33,33,32,32,32
840 DATA 32,32,32,32,32,32,32,31
850 DATA 31,31,31,31,31,31,31,31
860 DATA 32,32,32,32,32,32,32,32
870 DATA 32,32,31,31,31,31,31,31
880 DATA 31,31,31,31,30,30,30,30
890 DATA 30,29,29,29,28,28,28,27
900 DATA 27,26,26,26,25,25,24,24
910 DATA 23,22,22,21,21,20,19,19
920 DATA 18,17,17,16,15,15,14,13
930 DATA 13,12,11,11,10,9,9,8
940 DATA 7,7,6,6,5,5,4,4
950 DATA 3,3,2,2,2,1,1,1
```

```
960 DATA 1,0,0,0,0,0,0,0
970 DATA 0,0,0,1,1,1,1,2
980 DATA 2,3,3,4,4,5,5,6
990 DATA 7,7,8,9,10,11,12,13
1000 DATA 14,15,16,17,18,19,20,2
1
1010 DATA 22,23,24,26,27,28,29,3
0
1020 DATA 32,32,33,34,35,35,36,3
7
1030 DATA 38,38,39,40,41,41,42,4
3
1040 DATA 44,44,45,46,46,47,48,4
8
1050 DATA 49,50,50,51,51,52,53,5
3
1060 DATA 54,54,55,55,56,56,57,5
7
1070 DATA 58,58,59,59,59,60,60,6
0
1080 DATA 61,61,61,61,62,62,62,6
2
1090 DATA 62,63,63,63,63,63,63,6
3
1100 DATA 63,63,63,63,63,63,63,6
3
1110 DATA 62,62,62,62,62,61,61,6
1
1120 DATA 61,60,60,60,59,59,59,5
8
1130 DATA 58,57,57,56,56,55,55,5
4
1140 DATA 54,53,53,52,51,51,50,5
0
1150 DATA 49,48,48,47,46,46,45,4
4
1160 DATA 44,43,42,41,41,40,39,3
8
1170 DATA 38,37,36,35,35,34,33,3
2
1180 DATA 32,31,30,29,28,28,27,2
6
1190 DATA 25,25,24,23,22,22,21,2
0
1200 DATA 19,19,18,17,17,16,15,1
5
1210 DATA 14,13,13,12,12,11,10,1
0
1220 DATA 9,9,8,8,7,7,6,6
1230 DATA 5,5,4,4,4,3,3,3
1240 DATA 2,2,2,2,1,1,1,1
1250 DATA 1,0,0,0,0,0,0,0
1260 DATA 0,0,0,0,0,0,0,0
1270 DATA 1,1,1,1,1,2,2,2
1280 DATA 2,3,3,3,4,4,4,5
1290 DATA 5,6,6,7,7,8,8,9
1300 DATA 9,10,10,11,12,12,13,13
1310 DATA 14,15,15,16,17,17,18,1
9
```

```
1320 DATA 19,20,21,22,22,23,24,2
5
1330 DATA 25,26,27,28,28,29,30,3
1
1340 DATA 0,255,0,255,75,255,0,2
55
1350 DATA 0,255,0,255,0,255,0,25
5
1360 DATA 0,255,0,255,0,255,0,52
1370 DATA 112,48,141,251,227,31,
16,237
1380 DATA 140,222,76,237,140,223
,76,237
1390 DATA 140,224,76,237,140,225
,238,140
1400 DATA 228,134,63,183,255,35,
55,6
1410 DATA 16,131,255,255,16,39,0
,100
1420 DATA 237,140,192,55,6,237,1
40,192
1430 DATA 55,6,237,140,192,55,6,
237
1440 DATA 140,192,55,2,167,140,1
89,79
1450 DATA 95,237,140,165,237,140
,167,237
1460 DATA 140,169,237,140,171,16
,142,0
1470 DATA 107,48,140,148,166,148
,171,152
1480 DATA 5,171,152,10,171,152,1
5,183
1490 DATA 255,32,236,1,227,3,237
,1
1500 DATA 236,6,227,8,237,6,236,
11
1510 DATA 227,13,237,11,236,136,
16,227
1520 DATA 136,18,237,136,16,49,6
3,39
1530 DATA 2,32,206,106,141,255,1
17,38
1540 DATA 196,22,255,146,53,240,
4,250
1550 DATA 0,0,0,0,4,250,1,6
1560 DATA 0,0,0,0,0,6,0,1
1570 DATA 255,255,112,0,0,0,0,0
1580 DATA 112,0,1,3,0,3,0,4
1590 DATA 0,3,0,2,255,255,3,0
1600 DATA 8,0,8,0,3,0,2,8
1610 DATA 0,10,0,10,0,8,0,3
1620 DATA 255,255,9,121,10,210,1
1,250
1630 DATA 13,63,16,10,32,11,112,
13
1640 DATA 48,13,128,16,9,121,10,
210
```

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```
1650 DATA 11,250,13,63,16,7,250,
8
1660 DATA 240,9,121,10,210,16,25
5,255
1670 DATA 175,175,175,175,175,17
5,175,175
1680 DATA 175,175,175,175,175,17
5,175,175
1690 DATA 175,175,175,175,175,17
5,175,175
1700 DATA 175,175,175,175,175,17
5,175,175
1710 DATA 175,188,190,189,188,19
0,189,188
1720 DATA 190,189,188,190,189,18
8,190,189
1730 DATA 188,190,189,188,190,18
9,188,190
1740 DATA 189,188,190,189,188,19
0,189,175
1750 DATA 175,179,187,183,179,18
7,183,179
1760 DATA 187,183,179,187,183,17
9,187,183
1770 DATA 179,187,183,179,187,18
3,179,187
1780 DATA 183,179,187,183,179,18
7,183,175
1790 DATA 175,128,186,181,128,18
6,181,128
1800 DATA 186,181,128,186,181,12
8,186,181
1810 DATA 128,186,181,128,186,18
1,128,186
1820 DATA 181,128,186,181,128,18
6,181,175
1830 DATA 175,188,190,189,188,19
0,189,188
1840 DATA 190,189,188,190,189,18
8,190,189
1850 DATA 188,190,189,188,190,18
9,188,190
1860 DATA 189,188,190,189,188,19
0,189,175
1870 DATA 175,179,187,183,179,18
7,183,179
1880 DATA 187,183,179,187,183,17
9,187,183
1890 DATA 179,187,183,179,187,18
3,179,187
1900 DATA 183,179,187,183,179,18
7,183,175
1910 DATA 175,128,186,181,128,18
6,181,128
1920 DATA 186,181,207,207,207,20
7,207,207
1930 DATA 207,207,207,207,207,20
7,128,186
```

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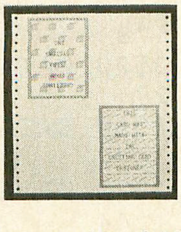

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```
1940 DATA 181,128,186,181,128,18
6,181,175
1950 DATA 175,188,190,189,188,19
0,189,188
1960 DATA 190,189,207,19,20,1,18
,32
1970 DATA 32,12,15,18,4,207,188,
190
1980 DATA 189,188,190,189,188,19
0,189,175
1990 DATA 175,179,187,183,179,18
7,183,179
2000 DATA 187,183,207,207,207,20
7,207,207
2010 DATA 207,207,207,207,207,20
7,179,187
2020 DATA 183,179,187,183,179,18
7,183,175
2030 DATA 175,128,186,181,128,18
6,104,67
2040 DATA 105,113,121,120,118,96
,66,89
2050 DATA 96,82,110,67,110,68,65
,83
2060 DATA 72,96,186,181,128,186,
181,175
2070 DATA 175,188,190,189,188,19
0,189,188
2080 DATA 190,189,188,190,189,18
8,190,189
2090 DATA 188,190,189,188,190,18
9,188,190
2100 DATA 189,188,190,189,188,19
0,189,175
2110 DATA 175,179,187,183,179,18
7,183,179
2120 DATA 187,183,179,187,74,15,
25,19
2130 DATA 20,9,3,11,187,183,179,
187
2140 DATA 183,179,187,183,179,18
7,183,175
2150 DATA 175,128,186,181,128,18
6,181,128
2160 DATA 186,181,128,186,181,12
8,186,15
2170 DATA 18,186,181,128,186,181
,128,186
2180 DATA 181,128,186,181,128,18
6,181,175
2190 DATA 175,188,190,189,188,19
0,189,188
2200 DATA 190,189,188,190,75,5,2
5,2
2210 DATA 15,1,18,4,190,189,188,
190
2220 DATA 189,188,190,189,188,19
0,189,175
2230 DATA 175,179,187,183,179,18
7,183,179
2240 DATA 187,183,179,187,183,17
9,187,183
2250 DATA 179,187,183,179,187,18
3,179,187
2260 DATA 183,179,187,183,179,18
7,183,175
2270 DATA 175,175,175,175,175,17
5,175,175
2280 DATA 175,175,175,175,175,17
5,175,175
2290 DATA 175,175,175,175,175,17
5,175,175
2300 DATA 175,175,175,175,175,17
5,175,175
2310 DATA 255,0,255,0,255,0,255,
0
2320 DATA 255,0,255,0,255,0,255,
0
2330 DATA 255,0,255,0,255,0,255,
0
2340 DATA 255,0,255,0,255,0,255,
0
2350 DATA 255,0,255,0,255,0,255,
0
2360 DATA 255,0,255,0,255,0,255,
0
2370 DATA 255,0,255,0,255,0,255,
0
2380 DATA 255,0,0,0,0,0,0,0
2390 DATA 0,0,3,0,255,2,255,0
2400 DATA 255,0,255,0,255,255,24
3,48
2410 DATA 192,204,12,63,243,51,3
,192
2420 DATA 252,240,192,48,204,207
,192,192
2430 DATA 48,12,15,195,51,255,12
,12
2440 DATA 204,76,252,170,170,170
,170,170
2450 DATA 170,170,170,0,255,0,25
5,0
2460 DATA 255,0,255,0,0,0,255,0
2470 DATA 63,207,243,252,3,0,23,
8
2480 DATA 152,142,56,44,159,114,
142,53
2490 DATA 37,191,1,13,182,255,3,
138
2500 DATA 1,183,255,3,23,3,182,1
27
2510 DATA 47,65,127,47,66,127,47
,67
2520 DATA 127,47,68,127,47,73,20
4,44
2530 DATA 226,253,44,21,23,252,8
8,23
2540 DATA 252,85,23,252,82,23,25
```

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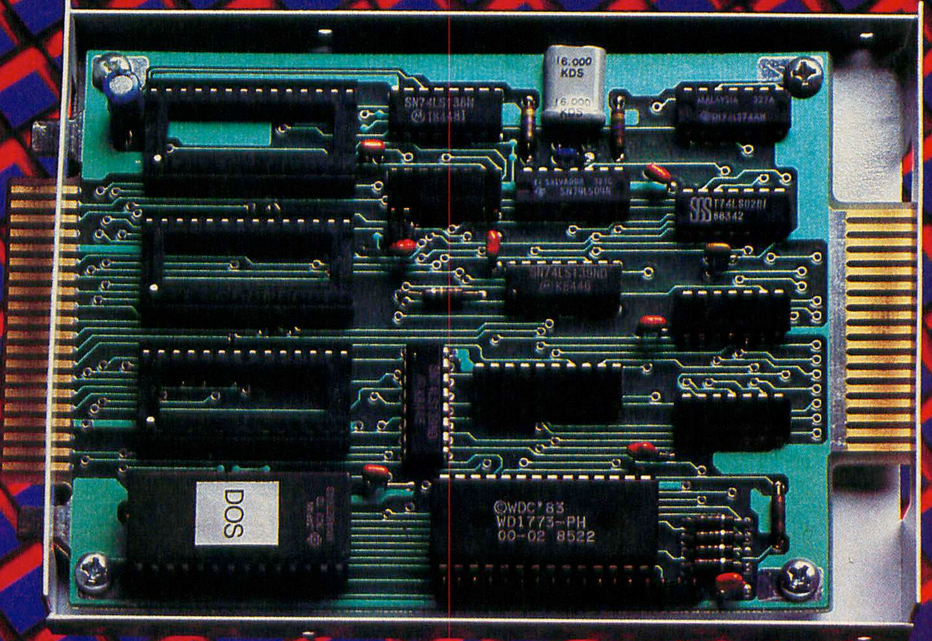

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  - EPROM Programmer or
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- New technology, no adjustments needed.
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There are currently four add-ons available from DISTO for this controller;

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The first is a Centronics Compatible Parallel Printer adapter. This adapter will allow you to connect a Centronics compatible printer directly to your controller, leaving the serial port of your computer free for your modem. Printer driver software included.

RTIME

The second is a Real Time Clock. This is a clock chip that will keep the proper time, date and year. A small battery keeps the time when the Computer is off, retreive and set the time by using simple Basic POKES. Also available with the Real Time Clock is the optional Centronics Compatible Parallel Printer adapter. Software to set the clock and printer driver included.

MPROM

The third is a Mini EPROM Programmer. Yes, a low cost programmer that attaches to the disk controller. A must for the DISTO Super Controller. Program those often used utilities into EPROM and plug them directly into your controller. Will program 2764's or 27128's, a perfect mate for the DISTO Super Controller.

DISPLAY80

The fourth is a real knock-out. This is a three in one card. It's major function is to add an 80* 24 display to your computer. A feature packed package also includes RTIME and PPRINT. All in one neat package that fits inside the controller. OS9 software available. Call for more information.

CREDITS:

The DISTO Super Controller, add-ons and all its documentation are conceived and designed by Tony Distefano. The DISTO Super Controller and add-ons are manufactured and distributed by; C.R.C. COMPUTER INC.
10802 Lajeunesse, Montréal, Québec, Canada H3L 2E8 1-514-383-5293

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```
2,79
2550 DATA 189,161,193,134,251,18
3,255,2
2560 DATA 182,255,0,132,2,39,14,
134
2570 DATA 247,183,255,2,182,255,
0,132
2580 DATA 2,38,232,32,3,115,47,7
3
2590 DATA 134,3,183,47,74,23,3,1
1
2600 DATA 134,64,183,47,48,23,5,
192
2610 DATA 127,47,76,204,5,4,253,
54
2620 DATA 213,23,3,231,22,4,218,
182
2630 DATA 47,75,142,4,76,72,76,6
4
2640 DATA 48,134,140,0,0,46,249,
125
2650 DATA 47,140,16,38,0,141,125
,47
2660 DATA 73,39,27,182,255,0,68,
36
2670 DATA 5,127,47,76,32,3,115,4
7
2680 DATA 76,173,159,160,10,182,
1,90
2690 DATA 129,32,37,89,32,31,189
,161
2700 DATA 193,252,1,88,193,247,3
9,5
2710 DATA 127,47,76,32,3,115,47,
76
2720 DATA 129,247,39,9,182,1,87,
129
2730 DATA 247,39,58,32,26,182,47
,48
2740 DATA 129,120,39,19,16,142,4
7,123
2750 DATA 198,172,23,5,103,182,4
7,48
2760 DATA 76,183,47,48,23,5,65,1
82
2770 DATA 47,48,198,172,253,54,2
05,204
2780 DATA 170,184,253,56,9,198,4
,206
2790 DATA 47,105,247,56,11,255,5
4,203
2800 DATA 23,6,246,32,22,182,47,
48
2810 DATA 129,2,39,219,16,142,47
,123
2820 DATA 198,172,23,5,47,182,47
,48
2830 DATA 74,32,198,182,47,44,38
```

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For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submissions Editor, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you some more comprehensive guidelines.

Please do not submit programs or articles currently submitted to another publication.

```
,39
2840 DATA 182,47,76,16,39,1,53,2
06
2850 DATA 44,166,255,44,21,23,25
1,87
2860 DATA 127,47,76,115,47,44,18
2,47
2870 DATA 48,139,2,198,171,253,4
7,46
2880 DATA 16,142,47,44,23,5,22,2
52
2890 DATA 47,46,193,34,35,19,90,
247
2900 DATA 47,47,23,4,166,182,47,
45
2910 DATA 164,132,167,132,48,136
,32,32
2920 DATA 12,127,47,44,127,47,46
,127
2930 DATA 47,47,23,4,142,198,170
,231
2940 DATA 132,22,0,232,99,132,11
1,1
2950 DATA 182,47,77,198,34,237,2
,253
2960 DATA 54,205,204,67,18,253,5
6,9
2970 DATA 247,56,11,23,6,107,206
,44
2980 DATA 186,255,44,21,22,250,2
40,125
2990 DATA 47,140,16,38,0,136,129
,120
3000 DATA 34,13,129,2,37,9,193,3
4
3010 DATA 37,9,193,170,34,5,57,9
6
3020 DATA 196,32,243,96,65,57,12
5,47
3030 DATA 140,38,9,16,142,47,115
,236
3040 DATA 2,23,4,128,204,5,5,253
3050 DATA 47,78,182,47,48,198,17
2,253
3060 DATA 47,82,236,2,253,47,80,
23
3070 DATA 4,2,43,75,252,47,46,25
3
3080 DATA 47,82,23,3,247,43,30,2
36
3090 DATA 2,125,47,140,38,56,235
,65
3100 DATA 171,196,237,2,253,54,2
05,204
3110 DATA 168,184,253,56,9,198,4
,247
3120 DATA 56,11,22,5,244,127,47,
44
```

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3130 DATA 127,47,46,127,47,47,99
,1
3140 DATA 182,47,75,76,198,225,6
1,23
3150 DATA 3,177,236,2,23,255,96,
122
3160 DATA 47,133,16,39,2,100,57,
23
3170 DATA 1,51,32,217,125,47,140
,38
3180 DATA 245,182,47,48,160,2,42
,1
3190 DATA 64,129,10,35,1,57,16,1
42
3200 DATA 47,24,49,36,16,140,47,
44
3210 DATA 39,17,166,164,38,244,9
9,164
3220 DATA 236,2,139,2,203,4,237,
34
3230 DATA 23,4,2,57,125,47,132,1
6
3240 DATA 38,2,93,142,47,8,182,4
7
3250 DATA 75,129,3,35,2,134,3,13
9
3260 DATA 1,177,47,133,35,6,182,
47
3270 DATA 133,183,47,141,183,47,
131,166
3280 DATA 132,38,60,125,47,141,3
8,97
3290 DATA 182,47,84,139,1,132,3,
183
3300 DATA 47,84,167,136,43,198,5
,61
3310 DATA 52,16,206,47,85,51,197
,255
3320 DATA 54,203,23,254,207,53,1
6,166
3330 DATA 2,177,47,48,37,7,134,2
55
3340 DATA 167,136,41,32,5,134,1,
167
3350 DATA 136,41,134,1,167,136,4
2,51
3360 DATA 136,41,236,2,23,254,20
8,166
3370 DATA 66,198,5,61,16,142,47,
85
3380 DATA 49,165,16,191,54,203,5
2,16
3390 DATA 23,254,219,53,16,52,16
,23
3400 DATA 255,74,53,16,122,47,13
1,39
3410 DATA 4,48,4,32,146,142,47,2
8
```

```
3420 DATA 166,132,39,55,236,2,92
,231
3430 DATA 3,52,16,23,3,19,53,32
3440 DATA 193,1,39,23,193,3,39,1
1
3450 DATA 166,33,164,132,167,132
,48,136
3460 DATA 224,32,13,230,35,193,1
71,35
3470 DATA 239,141,66,111,164,48,
136,224
3480 DATA 230,33,202,85,83,234,1
32,231
3490 DATA 132,31,33,48,4,140,47,
44
3500 DATA 38,190,142,47,8,166,1,
39
3510 DATA 13,16,142,47,115,236,2
,23
3520 DATA 3,2,111,132,111,1,48,4
3530 DATA 140,47,24,38,232,122,4
7,140
3540 DATA 43,3,22,253,34,134,3,1
83
3550 DATA 47,140,22,253,26,122,4
7,74
3560 DATA 39,50,206,44,206,255,4
4,21
3570 DATA 23,249,28,206,16,31,19
8,85
3580 DATA 231,196,51,200,32,17,1
31,17
3590 DATA 159,37,245,182,47,74,3
9,4
3600 DATA 129,3,37,2,134,3,198,2
55
3610 DATA 206,16,31,51,200,96,23
1,196
3620 DATA 74,38,248,57,16,206,12
7,0
3630 DATA 16,142,47,123,182,47,4
8,198
3640 DATA 172,23,2,160,190,47,65
,188
3650 DATA 47,69,37,30,39,11,191,
47
3660 DATA 69,190,47,67,191,47,71
,32
3670 DATA 17,190,47,67,188,47,71
,37
3680 DATA 9,191,47,71,190,47,65,
191
3690 DATA 47,69,22,4,211,79,183,
255
3700 DATA 198,183,255,201,183,25
5,202,183
3710 DATA 255,204,183,255,206,18
3,255,208
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3720 DATA 183,255,210,183,255,19
2,183,255
3730 DATA 194,183,255,196,183,25
5,34,142
3740 DATA 45,8,16,142,4,0,236,12
9
3750 DATA 237,161,16,140,6,0,37,
246
3760 DATA 190,47,69,191,54,12,19
0,47
3770 DATA 71,191,54,14,23,2,221,
142
3780 DATA 4,20,141,40,190,47,65,
191
3790 DATA 54,12,190,47,67,191,54
,14
3800 DATA 23,2,201,142,5,249,141
,20
3810 DATA 142,0,0,191,54,12,134,
0
3820 DATA 246,47,75,253,54,14,23
,2
3830 DATA 179,142,5,238,206,54,8
,198
3840 DATA 3,166,197,132,15,139,4
8,167
3850 DATA 130,166,197,68,68,68,6
8,139
3860 DATA 48,167,130,90,43,2,32,
233
3870 DATA 26,16,57,79,183,255,19
8,183
3880 DATA 255,200,183,255,202,18
3,255,205
3890 DATA 183,255,206,183,255,20
8,183,255
3900 DATA 210,183,255,192,183,25
5,195,183
3910 DATA 255,197,182,47,75,132,
3,198
3920 DATA 8,61,203,224,247,255,3
4,28
3930 DATA 175,57,142,20,64,204,1
70,170
3940 DATA 237,129,140,37,96,37,2
49,16
3950 DATA 206,127,0,134,1,183,47
,24
3960 DATA 183,47,132,182,47,74,7
6,183
3970 DATA 47,74,23,254,190,127,4
7,25
3980 DATA 182,47,77,183,47,26,13
4,34
3990 DATA 183,47,27,134,4,183,47
,135
4000 DATA 16,142,47,115,252,47,2
6,23
4010 DATA 1,122,252,47,26,253,47
,80
4020 DATA 252,47,46,253,47,82,20
4,5
4030 DATA 5,253,47,78,23,0,253,4
3
4040 DATA 88,125,47,140,38,54,18
2,47
4050 DATA 26,187,47,24,183,47,26
,129
4060 DATA 121,37,11,112,47,24,12
4,47
4070 DATA 27,124,47,27,32,18,129
,1
4080 DATA 34,14,112,47,24,124,47
,27
4090 DATA 124,47,27,134,4,183,47
,135
4100 DATA 246,47,27,193,170,36,5
8,122
4110 DATA 47,135,39,236,206,47,1
10,255
4120 DATA 54,203,252,47,26,253,5
4,205
4130 DATA 204,168,184,253,56,9,1
98,4
4140 DATA 247,56,11,23,2,195,22,
254
4150 DATA 20,124,47,75,182,47,75
,72
4160 DATA 72,72,198,255,61,23,0,
131
4170 DATA 127,47,44,127,47,46,12
7,47
4180 DATA 47,198,16,247,47,133,1
27,47
4190 DATA 141,127,47,84,127,47,8
,127
4200 DATA 47,12,127,47,16,127,47
,20
4210 DATA 127,47,9,127,47,13,127
,47
4220 DATA 17,127,47,21,127,47,13
2,127
4230 DATA 47,28,127,47,32,127,47
,36
4240 DATA 127,47,40,127,47,44,16
,206
4250 DATA 127,0,134,3,183,47,140
,23
4260 DATA 254,201,22,250,226,182
,255,3
4270 DATA 43,1,59,182,255,2,182,
47
4280 DATA 77,139,7,129,120,34,16
,183
4290 DATA 47,77,134,251,183,255,
2,182
```

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OS-9 Communications program.

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Designed for maintaining personnel and payroll data for up to 200 hourly and salaried employees with 8 deductions each. Calculates payroll and tax amounts, prints checks and maintains year-to-date totals which can be automatically transferred to the SBA package. Computes each pay period's totals for straight time, overtime and bonus pay and determines taxes to be withheld. Additional outputs include mailing list, listing of employees, year-to-date federal and/or state tax listing, and a listing of current misc. deductions. Suited for use in all states except Oklahoma and Delaware. **$59.95**

These programs are user friendly and menu driven. Sample transactions are included. Each package features a hi-res screen. Each requires a printer, a minimum of 32k and at least 1 disk drive.

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ACCOUNTS PAYABLE

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```
4300 DATA 255,0,132,64,39,5,59,1
28
4310 DATA 118,32,236,189,161,193
,134,254
4320 DATA 183,255,2,182,255,0,13
2,64
4330 DATA 38,244,59,243,47,67,25
3,47
4340 DATA 67,252,47,65,201,0,137
,0
4350 DATA 253,47,65,57,252,47,80
,241
4360 DATA 47,83,34,21,177,47,82,
34
4370 DATA 16,243,47,78,241,47,83
,37
4380 DATA 8,177,47,82,37,3,134,2
55
4390 DATA 57,79,57,183,47,134,68
,68
4400 DATA 183,54,221,134,32,61,2
43,54
4410 DATA 223,251,54,221,137,0,3
1,1
4420 DATA 57,141,232,182,54,221,
72,72
4430 DATA 176,47,134,64,230,132,
74,43
4440 DATA 4,84,84,32,249,196,3,5
7
4450 DATA 198,172,141,207,16,142
,47,123
4460 DATA 236,132,237,161,236,13
6,32,237
4470 DATA 161,236,136,64,237,161
,236,136
4480 DATA 96,237,164,57,52,16,14
1,179
4490 DATA 236,161,237,132,236,16
1,237,136
4500 DATA 32,236,161,237,136,64,
236,164
4510 DATA 237,136,96,53,144,141,
156,182
4520 DATA 54,221,72,72,176,47,13
4,64
4530 DATA 206,47,136,230,198,231
,33,228
4540 DATA 132,231,132,57,41,0,25
5,0
4550 DATA 255,0,255,0,255,0,255,
0
4560 DATA 0,0,0,1,0,0,0,2
4570 DATA 0,0,0,4,0,0,0,8
4580 DATA 0,0,0,22,0,0,0,50
4590 DATA 0,0,0,100,0,0,1,40
4600 DATA 0,0,2,86,0,0,5,18
4610 DATA 0,0,16,36,0,0,32,72
4620 DATA 0,0,64,150,0,0,129,146
4630 DATA 0,1,99,132,0,3,39,104
4640 DATA 0,6,85,54,0,19,16,114
4650 DATA 0,38,33,68,0,82,66,136
4660 DATA 1,4,133,118,2,9,113,82
4670 DATA 4,25,67,4,8,56,134,8
4680 DATA 22,119,114,22,51,85,68
,50
4690 DATA 103,16,136,100,16,142,
54,12
4700 DATA 127,54,8,127,54,9,127,
54
4710 DATA 10,127,54,11,142,54,16
,166
4720 DATA 130,198,9,140,54,11,39
,50
4730 DATA 90,39,244,49,36,68,36,
248
4740 DATA 238,164,255,54,4,238,3
4,255
4750 DATA 54,6,52,118,141,4,53,1
18
4760 DATA 32,230,206,54,12,16,14
2,54
4770 DATA 12,142,54,8,198,4,28,2
54
4780 DATA 166,130,169,162,25,167
```

TOTHIAN SOFTWARE

TIME MASTER Calendars, biorhythms, human compatibility, more. Fun at parties. Printer optional. Reviewed 12/85. 16K ECB. $19.95

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RAINBOW CERTIFICATION SEAL

All of these programs carry the Rainbow Seal.

```
,194,90
4790 DATA 38,246,57,0,255,0,0,0
4800 DATA 0,0,0,0,0,0,0,0
4810 DATA 0,0,0,0,0,0,0,16
4820 DATA 0,0,0,49,141,255,230,2
36
4830 DATA 164,68,68,167,168,16,1
34,32
4840 DATA 61,227,168,18,235,168,
16,137
4850 DATA 0,237,34,237,36,166,16
8,16
4860 DATA 72,72,160,164,64,167,1
68,17
4870 DATA 128,4,64,167,42,76,167
,39
4880 DATA 111,38,236,40,237,43,2
38,62
4890 DATA 57,141,200,166,168,17,
23,0
4900 DATA 93,231,47,166,184,2,61
,134
4910 DATA 4,237,45,104,46,105,38
,104
4920 DATA 46,105,38,106,45,106,4
3,38
4930 DATA 34,174,34,48,136,32,17
5,34
4940 DATA 175,36,230,132,166,47,
61,231
4950 DATA 46,236,39,237,42,106,4
4,38
4960 DATA 10,166,45,141,41,166,3
8,61
4970 DATA 231,196,57,109,45,38,1
0,230
4980 DATA 38,231,192,111,38,134,
4,167
4990 DATA 45,106,42,38,190,174,3
6,48
5000 DATA 1,166,132,175,36,167,4
6,134
5010 DATA 4,167,42,22,255,173,48
,141
5020 DATA 0,3,230,134,57,1,4,16
5030 DATA 64,23,255,87,166,168,1
7,167
5040 DATA 39,166,40,132,3,171,16
8,17
5050 DATA 167,168,21,166,192,198
,4,237
5060 DATA 46,104,46,105,38,104,4
6,105
5070 DATA 38,106,47,106,42,106,4
3,38
5080 DATA 7,166,168,21,167,45,32
,32
5090 DATA 109,42,38,22,230,39,20
3,4
5100 DATA 231,45,141,61,111,39,1
11,38
5110 DATA 174,36,48,1,175,36,134
,4
5120 DATA 167,42,109,47,38,203,3
2,195
5130 DATA 166,42,141,162,166,38,
61,231
5140 DATA 38,141,30,111,38,174,3
4,48
5150 DATA 136,32,175,34,175,36,2
30,40
5160 DATA 134,4,160,168,17,237,4
2,166
5170 DATA 168,17,167,39,106,44,3
8,210
5180 DATA 57,48,141,0,28,230,45,
166
5190 DATA 38,165,184,4,164,133,1
67,168
5200 DATA 20,166,184,4,99,133,16
4,133
5210 DATA 170,168,20,167,184,4,9
9,133
5220 DATA 57,255,192,240,252,255
,63,15
5230 DATA 3,141,10,57,18,127,47,
75
5240 DATA 141,3,22,247,92,142,16
,0
5250 DATA 204,119,220,237,129,14
0,20,192
5260 DATA 37,249,204,170,170,237
,129,140
5270 DATA 37,96,37,249,204,85,85
,237
5280 DATA 129,140,40,0,37,249,23
,250
5290 DATA 162,57,0,255,0,255,0,2
55
```

CHECKING ACCOUNT INFORMATION SYSTEM

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(Reviewed in RAINBOW April'86 issue, pg. 185)

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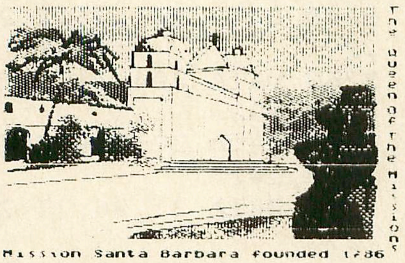

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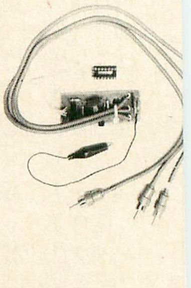

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Mono II for Color Computer 2. An excellent monochrome monitor driver that has audio output also. Specify model needed.

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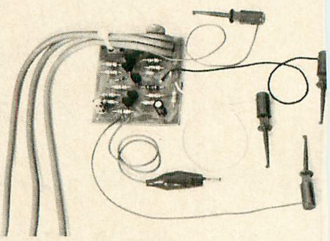

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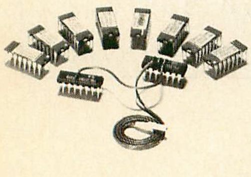

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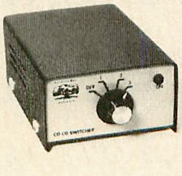

The CoCo Switcher allows you to hook u three peripherals to your RS-232 jack. Cor nect your modem, printer and any othe RS-232 compatible peripheral to the CoC Switcher. An LED on the CoCo Switche shows if your computer is on or off at a glance The LED flickers when transmitting or receiv ing data.

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16K
Disk

Use this program to design Escher-type graphics

Esch-A-Sketch

By Eric White

> *"No one can draw a line that is not a boundary line; every line splits a singularity into a plurality. Every closed contour, no matter what its shape, whether a perfect circle or an irregular random form, evokes in addition the notions of 'inside' and 'outside' and the suggestion of 'near' and 'far away', of 'object' and 'background'."*
>
> — *M.C. Escher*

I have always been a great fan of M.C. Escher and his self-perpetuating patterns. Escher had the unique ability to blend shape and form with perfect balance. From his drawings, one feels a sense of complete unity and purpose of form.

In a search for techniques to create Escher-type designs I tried many standard graphic techniques such as tracing paper and pencil, but had little success. When drawing a self-perpetuating pattern, each line creates both an "inside" and "outside" border simultaneously. This can get quite frustrating as you try to keep the subject recognizable. Needless to say this technique was time consuming and tedious.

The main challenge is to draw both sides of the subject at the same time. The computer is the perfect medium to attempt to solve this problem. Listing 1 is a short version of *Escher.bas* and accepts X-Pad, Joystick or Hi-Res pak for input. Type in the program and save it before trying to use it.

You need to edit Line 440 with the appropriate device number. This value is stored in the variable DV. For the X-Pad use a value of 1 (this is the default). If you want to use a Hi-Res pak, use a value of 2. Those using the standard joystick port input need to set DV equal to 3. Edit in the appropriate value before running the program in Listing 1.

Listing 2 is a DMP-200 graphics print program for use with pictures created with *Escher.bas*. This program prints a full 8-by-10.5 inch swatch of your patterns.

I have learned a lot in experimenting with Escher's world. I can't help but wonder what he would have done next if he had the use of todays microcomputers to continue his work. ☐

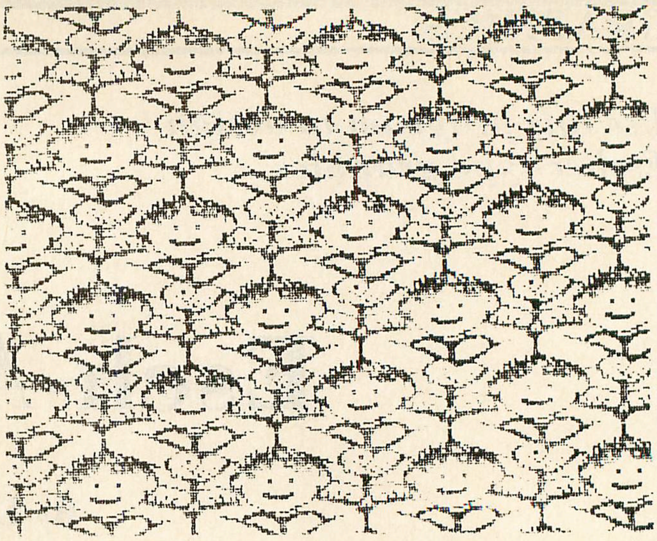
ESCHER KEYBOARD INPUTS

C	clear screen to white	destroys picture buf.
W	white pen color	changes pen color
B	black pen color	changes pen color
1-3	pen size	1x1, 2x2, 3x3 square
M	mirror effect on/off	mirrors pen position
S	save Hi-Res picture	saves to tape/disk
X	X-Pad input device	change drawing device
J	joystick input device	change drawing device
P	Hi-Res pak input dev.	change drawing device
" "	update whole picture	press spacebar

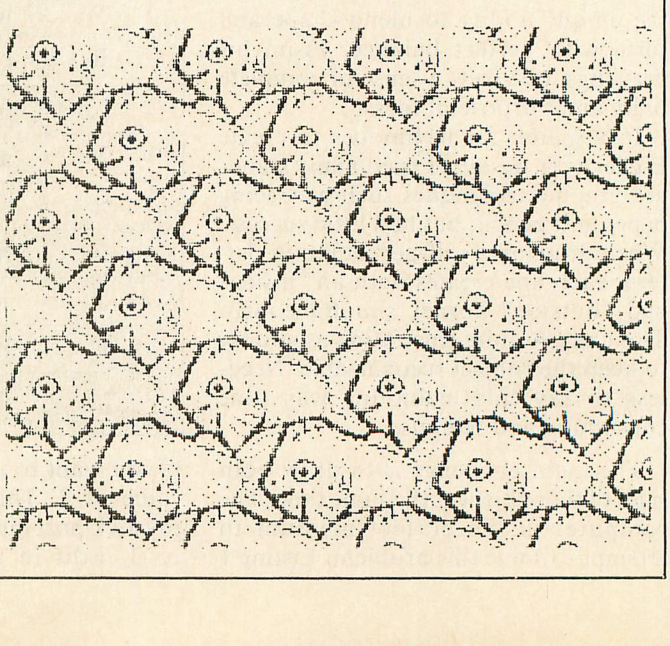
180 113
360 91
END 78

Listing 1: ESCHER

```
10 ON DV GOTO 30,40,50
20 GOTO430' & SET UP VARIBLES
30 X=PEEK(65376):Y=PEEK(65377):S
=PEEK(65378):GOTO 60 ' X PAD
40 Y=PEEK(65433)/1.15:X=PEEK(654
34):S=PEEK(65424)+3:GOTO60'HIRES
50 X=JOYSTK(0):Y=JOYSTK(1):S=(PE
EK(65280)AND1)+3         ' JOYSTICK
60 PUT(X,Y)-(X+K,Y+K),C,NOT
70 IF S=3 THEN 90 ELSE PUT(X,Y)-
(X+K,Y+K),C,NOT
80 A$=INKEY$:IF A$<>"" THEN 180
ELSE 10
90 COLORC:LINE(X,Y)-(X+K,Y+K),PS
ET,BF
100 XR=INT(X/((R+1)*2))*((R+1)*2
)
110 X=X-XR
120 IF M THEN LINE(R-X+XR+R+1,Y)
-(R-X+XR+K+R+1,Y+K),PSET,BF
130 Y=Y-INT(Y/((R+1)*2))*((R+1)*
2)
140 IF Y>R THEN Y=Y-R-1:X=X-R-1:
IF X<0 THEN X=(R+1)*2+X
150 COLORC:LINE(X+W,Y+W)-(X+K+W,
Y+K+W),PSET,BF
160 IF M THEN LINE(R+(R-X)+W+1,Y
+W)-(R+(R-X)+K+W+1,Y+K+W),PSET,B
F
170 GOTO 10
180 IF A$="C" THEN 400' CLEARPIC
190 IF A$="W" THEN C=1' WHITE
200 IF A$="B" THEN C=0' BLACK
210 IF A$="1" THEN K=0' PENSIZE1
220 IF A$="2" THEN K=1' PENSIZE2
230 IF A$="3" THEN K=2' PENSIZE3
240 IF A$="X" THEN DV=1'X-PAD
250 IF A$="P" THEN DV=2'HIRESPAK
260 IF A$="J" THEN DV=3'JOYSTICK
270 IF A$="M" THEN IF M THEN M=0
 ELSE M=1' MIRROR ON/OFF
280 IF A$="S" THEN CLS:PRINT"NAM
E TO SAVE AS (......./"ET$")":P
RINT@16,"(";:LINEINPUT A$:PRINT@
17,A$:PRINT@25,"/"ET$")":IF A$="
" THEN450 ELSE IF PEEK(188)=6 TH
EN CSAVEM LEFT$(A$,8),&H600,&H1D
FF,R+1 ELSE SAVEM LEFT$(A$,8)+"/
"+ET$,&HE00,&H25FF,R+1:GO
```



```
290 IF A$<>" " THEN 10'UPDATE PI
CTURE
300 SCREEN1,0':POKE65495,0'SPEED
 POKE
310 GET(W,W)-(R+W,R+W),A
320 GET(W+R+1,W)-(W+R+R+1,R+W),B
330 F=0
340 FOR X=0 TO 255 STEP R+1
350 FOR Y=0 TO 191 STEP R+1
360 IF F THEN PUT(X,Y)-(X+R,Y+R)
,B,PSET:F=0 ELSE PUT(X,Y)-(X+R,Y
+R),A,PSET:F=1
370 NEXTY:IF F=0 THEN F=1 ELSE F
=0
380 NEXTX':POKE65494,0'SLOW POKE
390 SCREEN1,1:GOTO10
400 CLS:INPUT"ARE YOU SURE YOU W
ANT TO CLEAR  THE SCREEN (Y/N)";
A$
410 IF A$<>"Y" THEN SCREEN1,1:GO
TO10
420 PCLS1:COLOR0:SCREEN1,1:GOTO4
50
```

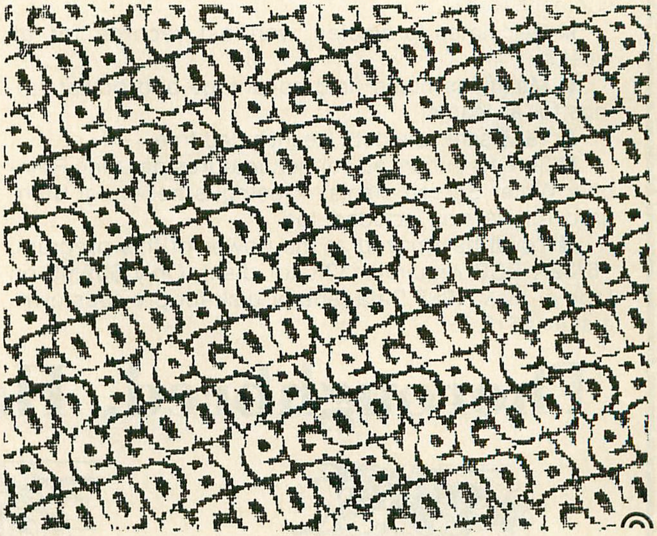


```
430 W=32:R=W-1:W=W*3:ET$="ESH"
440 DIM A(R),B(R),C(9):K=1:DV=1
450 PMODE4:SCREEN1,1:GOTO10
460 ' *************************
470 ' *  A STUDY OF REGULAR   *
480 ' * DIVISION OF THE PLANE *
490 ' *************************
500 ' *   COPYRIGHT 1986 BY   *
510 ' *     ERIC M. WHITE     *
520 ' *  ALL RIGHTS RESERVED  *
530 ' *************************
540 ' * VERSION: 1.0  8604.20 *
550 ' *************************
```

```
140 .......74
END .....246
```

Listing 2: PRINT200

```
10 CLEAR4000:ET$="ESH":DIM PR$(6
4)
20 GN$=CHR$(18)' GRAPHICS ON
30 GF$=CHR$(30)' GRAPHICS OFF
40 CLS:PRINT"NAME TO LOAD IS (..
....../"ET$")"
50 PRINT@16,"(";:LINEINPUT A$:PR
INT@17,A$
60 PRINT@25,"/"ET$")":IF A$="" T
HEN RUN ELSE IF PEEK(188)=6 THEN
 CLOADM LEFT$(A$,8) ELSE LOADM L
EFT$(A$,8)+"/"+ET$
70 PMODE4:SCREEN1,1
80 PRINT#-2,CHR$(27)CHR$(23)' CO
MPRESS ON
90 FORY1=1 TO 63 STEP7
100 FORX1=0 TO 63
110 FORY2=0 TO 6
120 IF PPOINT(X1,Y1+Y2)=0 THEN N
B=NB+INT(2^Y2)
130 NEXT Y2
140 PR$(Y1)=PR$(Y1)+CHR$(NB+128)
:NB=0
150 NEXT X1:PRINT#-2,GN$;
160 FORL=1TO9:PRINT#-2,PR$(Y1);:
NEXT
170 PRINT#-2:NEXT Y1
180 FOR X=0 TO 10
190 FOR Y1=1 TO 63 STEP 7
200 FOR L=1TO9:PRINT#-2,PR$(Y1);
:NEXTL
210 PRINT#-2:NEXT Y1,X
220 PRINT#-2,GF$CHR$(12);:RUN
500 ' ***************************
510 ' * ESCHER DMP-200 GRAPHIC *
520 ' * PATTERN PRINTOUT PROG. *
530 ' ***************************
540 ' *     COPYRIGHT 1986 BY    *
550 ' *       ERIC M. WHITE      *
560 ' *   ALL RIGHTS RESERVED    *
570 ' ***************************
580 ' * VERSION: 1.0   8604.26 *
590 ' ***************************
```



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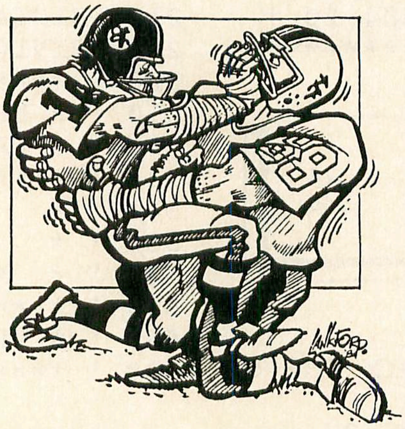
The Handicappers!

The Pros



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- Maintains home field advantage and power ratings for all teams.
- 1985 schedule data file included free.
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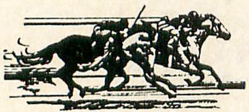

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HARNESS RACES

DOG RACES

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Fun and Foolery

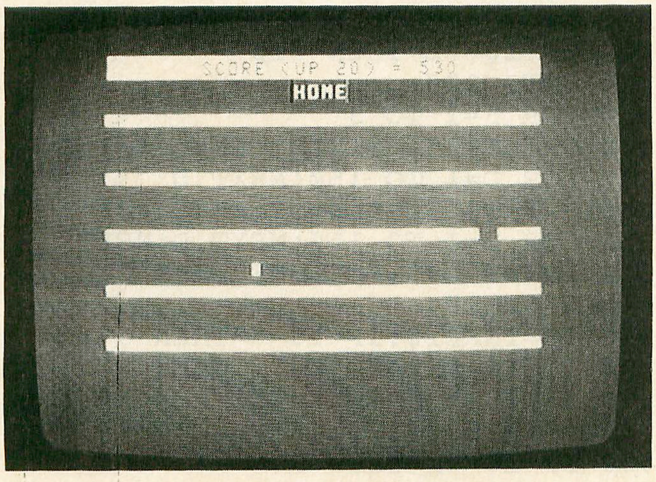
ARCADE | **16K ECB**

Mastering the Gates

By Keiran Kenny

This short game called *Gates* is not intended for sizzling zappers of cosmic creeps, but for those who lack the speed and dexterity needed to qualify as the fastest laser in the western galaxy.

The screen shows five equally spaced fences. You are the yellow spot at the bottom center of the screen and must pass through the gates in all five fences in order to reach home. The gates open and close at random and you never know when a gate will open, or stay open long enough to pass through.



When a gate opens in a fence, press the left- or right-arrow key to move in the required direction, then press the up-arrow key before the gate disappears and you will pass through and gain 20 points. If the gate slams shut, you bounce back and lose 10 points. *Gates* begins with an initial bonus score of 500, which should be enough to keep the score at a positive value.

The listing: GATES

```
0 'GATES: BY KEIRAN KENNY, 1985
10 CLS0:X=RND(-TIMER):OK=500
20 PRINT@0,"************GATES**
***********";
30 FORX=0TO63:SET(X,5,8):SET(X,1
0,8):SET(X,15,8):SET(X,20,8):SET
(X,25,8):NEXT
40 PRINT@46,"home";
50 H=32:V=28
60 P=RND(60):IFP/2=INT(P/2)THEN6
0
70 N=RND(5):L=N*5:K$=INKEY$
80 F=25+RND(55):TIMER=0
90 RESET(P,L):RESET(P+1,L):RESET
(P+2,L)
100 SET(H,V,2)
110 IFL=V-3THENK$=INKEY$ELSEGOTO
280
120 IFP+1>H THENS=2:GOTO170
```

```
130 IFP+1<H THENS=-2:GOTO150
140 IFP+1=H THEN190
150 IFK$<>CHR$(8)THEN110
160 IFK$=CHR$(8)THENFORX=H TO P+
1STEPS:SET(X,V,2):RESET(X+2,V):G
OSUB290:H=X:NEXT:RESET(H+2,V):GO
TO280
170 IFK$<>CHR$(9)THEN110
180 IFK$=CHR$(9)THENFORX=H TO P+
1STEPS:SET(X,V,2):RESET(X-2,V):G
OSUB290:H=X:NEXT:RESET(H-2,V):GO
TO280
190 IFK$<>CHR$(94)THEN110
200 IFK$=CHR$(94)THENFORX=L+3 TO
 L-2STEP-1:SET(H,X,2):RESET(H,X+
1):GOSUB290:IFPOINT(H,X-1)=8THEN
RESET(H,X):RESET(H,X+1):V=X+2:SE
T(H,V,2):SOUND128,1:Z=Z+10:B$="
(DOWN 10)":GOTO220ELSEV=X:NEXT:O
K=OK+20:B$=" (UP 20)":IFV>5THEN2
20
210 IFV<5THENPRINT@46,CHR$(128)+
CHR$(128)+CHR$(128)+CHR$(128);:P
RINT@0,CHR$(31)"HOME! SCORE ="OK
-Z;:GOTO230ELSE280
220 PRINT@0,CHR$(31):PRINT@7,"SC
ORE"+B$+" ="OK-Z:GOTO280
230 PRINT": ANOTHER? Y/N";
240 K$=INKEY$:IFK$=""THEN240
250 IFK$="Y"THENCLS:Z=0:GOTO10
260 IFK$="N"THENCLS:END
270 GOTO240
280 GOSUB290:IFPOINT(P+1,L)=8 TH
EN60ELSE110
290 IFTIMER>F THENSET(P,L,8):SET
(P+1,L,8):SET(P+2,L,8):RETURNELS
ERETURN
```

SIMULATION

16K
ECB

Laying Down the Chips

By Bill Bernico

At one time or another, most everyone has played bingo. It's one person's job to pick the little bingo chips from a revolving drum and call out the numbers. In the professional version, a plexiglass tank with 75 blowing ping pong balls is used. One ball at a time randomly pops up to the top as the next bingo number to be called. The following program, *Automatic Bingo Caller*, simulates this machine. It's not a bingo game but it randomly calls all of the 75 bingo numbers one at a time without duplication.

Upon running the program two lines are displayed at the top of the screen. The first line displays the numbers already called. The second line tells you how many numbers have not been called. Pressing 'C' picks the next number; 'B' and the game pauses so a player's card may be checked for a correct bingo; and 'N' starts a new game. If it turns out that a player did not have a bingo, pressing 'R' resumes that particular game. That's all there is to it!

The listing: BINGO

```
10 'ABC-AUTOMATIC BINGO CALLER
20 'BY BILL BERNICO
30 '708 MICHIGAN AVE.
40 'SHEBOYGAN, WI 53081
50 '(414) 459-7350
60 '
70 DIM B(15),C(5,15)
80 DATA 1,2,3,4,5,6,7,8,9,10,11,
12,13,14,15
90 FOR X=1 TO 15:READ B(X):NEXT
X
100 Y=96:CLS:FOR F=1 TO 5:FOR V=
1 TO 15
110 C(F,V)=(F-1)*15+V
120 NEXT V:NEXT F
130 FOR X=1 TO 75
140 F=RND(5):V=RND(15)
150 IF C(F,V)=0 THEN 140
160 C(F,V)=0
170 PRINT@0,"NUMBERS CALLED ="X
180 PRINT@32,"NUMBERS LEFT   ="7
5-X
190 PRINT@64,STRING$(32,131);
200 IF F=1 THEN PRINT@Y,"b"B(V);
210 IF F=2 THEN PRINT@Y,"i"B(V)+
15;
220 IF F=3 THEN PRINT@Y,"n"B(V)+
30;
230 IF F=4 THEN PRINT@Y,"g"B(V)+
45;
240 IF F=5 THEN PRINT@Y,"o"B(V)+
60;
250 IF X=75 THEN 310
260 Y=Y+4:PLAY"L25O5V5C"
270 I$=INKEY$:IF I$=""THEN 270
280 IF I$="C"THEN NEXT X
290 IF I$="B"THEN 310
300 GOTO 270
310 FOR F=1 TO 3
320 PRINT@25,"BINGO":EXEC 43345
330 FOR D=1 TO 150:NEXT D
340 PRINT@25,"bingo":EXEC 43345
350 FOR D=1 TO 150:NEXT D:NEXT F
360 PRINT@483,"rESUME THIS GAME
  nEW GAME";
370 I$=INKEY$:IF I$=""THEN 370
380 IF I$="R"AND X=75 THEN RUN
390 IF I$="R"AND X<75 THEN PRINT
@483,STRING$(27,143);:GOTO 280
400 IF I$="N"THEN RUN
410 GOTO 370
```

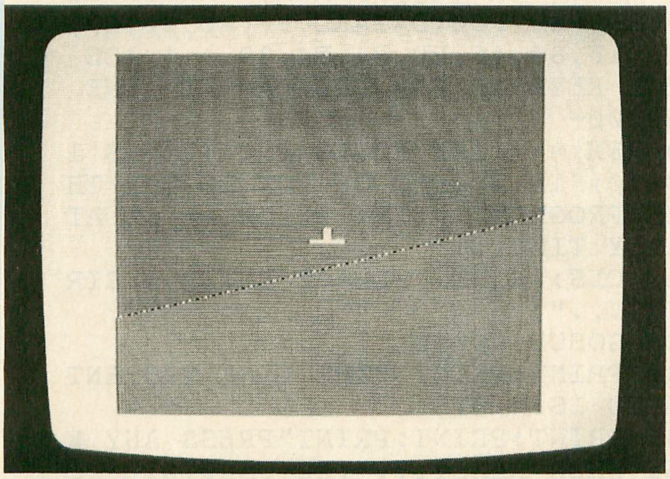
SIMULATION 16K ECB

Fly Off the Handle

By Archor Wright

The following program, *Simple Flight Simulator* demonstrates the basics of flight. It takes a while to be able to totally control the jet. The vertical movement of the right joystick controls the right half of the horizon and horizontal movement controls the left half of the horizon.

You can practice forever because the CoCo jet never runs out of fuel!



The listing: FLIGHT

```
0 POKE65495,0:CLS:PRINT@1,"sIMPL
E fLIGHT sIMULATOR";:PRINT@64,"C
REATED BY: ARCHOR WRIGHT";:PLAY"
P1":PMODE4,1:POKE179,1:PCLS:SCRE
EN1,1
1 H=JOYSTK(0):V=JOYSTK(1)
2 IFH<20THENA=A+1
3 IFV<20THENB=B-1
4 IFH>40THENA=A-1
5 IFV>40THENB=B+1
6 IFA<0THENA=A+1
7 IFB<0THENB=B+1
8 IFA>191THENA=A-1
9 IFB>191THENB=B-1
10 POKE178,1:LINE(0,1+A)-(255,1+
B),PSET:POKE178,2:LINE(0,A)-(255
,B),PSET:DRAW"BM128,96C1R9L18UR1
8L18R9U6RD6L2U6D6LU3D3R4U3":GOTO
1
```

AWARENESS 16K ECB

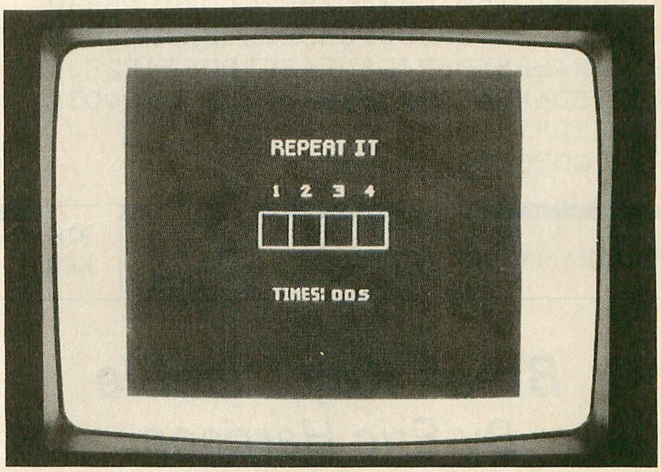
Calling to Mind

By David Huang

Repeat It is a game that requires a good memory. Four squares, along with the title and score, appear on the screen. Press any key to start the game and a square lights up with a short "beep." You must then press the number (1-4) corresponding to that square. If the computer's sequence is repeated correctly, the score increments by one and another square is added to the sequence. The sequence will be replayed by pressing the 'R' key. If a key is pressed that does not correspond to the square in sequence, the game ends.

The object of the game is to repeat as many sequences as possible to obtain a high score. Exceeding a score of 10 without replaying any sequence indicates great memorization.

Enjoy!



The listing: REPEATIT

```
10 DIMP(100),BE(50):Z=1
20 PMODE4,1:PCLS:SCREEN1,1
30 FORI=0TO9:READN$(I):NEXTI
40 DATA U5R4D5L4,BR2R2LU5G,NR5E4
HL2G,R5U3NL3U2L5,BR3U5G3R4,R4EUH
L3U2R4,R5U2L4ND2U3R4,BR4U3EUL4D,
R5U5L5D2NR4D3,R5U5L5D2R4
50 DRAW"BM96,40;ND7R4FDGNL4FFD2B
R3BU7NR5D3NR4D4R5BR3BU7ND7R4FD2G
L4BD3BR8BU7NR5D3NR4D4R5BR3BU7BDD
6U4NR5U2ER3FD6BR3BU7R4L2D7BR10BU
7R4L2D7L2R4BR4BU7R4L2D7"
60 DRAW"BM96,130;BR3U6NL2R2BR2R3
LD6NLRBR3U6F2E2D6BR3U6NR3D3NR3D3
R3BR3R3U3L3U3R3BR3D2BD2D2"
70 X=135:FORI=1TO3:DRAW"BM"+STR$
(X)+",130;"+N$(0):X=X+8:NEXTI
```

```
80 DRAW"BM88,80;D20R20U20NL20R20
D20NL20R20U20NL20R20D20L20"
90 X=95:FORI=1TO4:DRAW"BM"+STR$(
X)+",70;"+N$(I):X=X+20:NEXTI
100 A$=INKEY$:IFA$=""THEN100
110 C=RND(4)
120 P(Z)=C:FORT=1TOZ:PAINT(69+(P
(T)*20),85),,5:SOUND1,10:PUT(69+
(P(T)*20),81)-(69+(P(T)*20+18),9
9),BE,PSET:NEXTT:B=1
130 A$=INKEY$:IFA$=""THEN130
140 SOUND255,1
150 IF A$="R" THEN 120
160 IF VAL(A$)=P(B) THEN170 ELSE
190
170 B=B+1:IF B>Z THEN180ELSE130
180 TI$=STR$(Z):X=151:FORS=1TO3:
J$=LEFT$(RIGHT$(TI$,S),1):PUT(X,
122)-(X+5,130),BE,PSET:DRAW"BM"+
STR$(X)+",130;"+N$(VAL(J$)):X=X-
8:NEXTS:Z=Z+1:GOTO110
190 FORI=1TO10:SOUND1,1:NEXTI:DR
AW"BM97,150;U6R4D2BD2NLD2NL4BR3U
6R4D3NL3D3BR3U6F2NDE2D6BR3NR4U3N
R3U3R4BR8ND6R4D6NL4BR3BU6D4F2E2U
4BR3BD6NR4U3NR3U3R4BR3BD6U6R4D3L
4R2F2D"
200 GOTO 200
```

PROGRAMMING UTILITY	16K ECB MOD.	32K ECB

Break Key Disable

By Eric Harrison

The following program should be particularly useful in games and educational programs written for small children. It first disables the BREAK key, then places a machine language keyboard routine in memory. To call the program use a GOSUB 50000 and then copy the variable ZZ$ to whatever variable you want to use. This can be done with a simple assignment statement. To allow entry of a numeric variable, use VAL(ZZ$) and assign this to the appropriate variable.

Note that the BREAK key will work until Line 2 is executed. Also, the BREAK key is not disabled while in the direct command entry mode. This is to allow for editing of programs.

As written, the program requires 32K Extended Color BASIC but can be altered to run on a 16K ECB system as follows:

1) In Line 3 change the FOR loop values from &H7F00 to &H3F00 and &H7F0C to &H3F0C.
2) Change the CLEAR statement in Line 1 to CLEAR 600,&H3EFF.
3) In Line 3 change the DEFUSR statement to DEFUSR0=&H3F00.

The lisitng: BREAKDIS

```
1 CLEAR 600,&H7EFF     ' MEM FROM
 &H7F00 AND UP FOR M/L
2 READ X$,Y$:IFX$="0"THEN3 ELSE
X$="&H"+X$:Y$="&H"+Y$:X=VAL(X$):
Y=VAL(Y$):POKE X,Y:GOTO2:DATA F8
,32,F9,62,FA,1C,FB,AF,FC,7E,FD,A
D,FE,A5,19A,39,19B,0,19C,F8,19A,
7E,0,0   ' NOW THE break KEY IS D
ISABLED SORT OF.
3 FOR X=&H7F00 TO &H7F0C:READ A$
:V=VAL("&H"+A$):POKEX,V:NEXTX:DE
FUSR0=&H7F00:DATAAD,9F,A0,00,27,
FA,1F,89,4F,BD,B4,F4,39    ' ADD
M/L KEYREAD FOR PROGRAM AT LINE
50000-
9 REM *** THE FOLLOWING (LINES 1
0-50) IS A DEMO OF HOW TO USE TH
IS PROGRAM... TRY TO break IT AT
 ANY TIME!!!
10 CLS:PRINT "PLEASE ENTER A STR
ING...";
20 GOSUB 50000
30 PRINT:PRINT "THE LINE YOU ENT
ERED IS:";ZZ$
35 PRINT:PRINT:PRINT"PRESS ANY K
EY WHEN READY...":ZZ=USR0(0) ' C
ALL KEYREAD ROUTINE JUST FOR DEL
AY...
40 FOR X=1 TO 500:PRINT X:NEXT
50 END
10000 GOTO 10000
50000 ZZ$=""
50010 PRINT CHR$(128);
50020 WZ=USR0(0)
50030 WZ$=CHR$(WZ)
50040 PRINT CHR$(8);
50050 IFWZ=8 THEN IF LEN(ZZ$)<=0
 THEN 50110 ELSE ZZ$=LEFT$(ZZ$,L
EN(ZZ$)-1):PRINTCHR$(8);:GOTO500
10
50060 IF WZ=13 THEN PRINT:RETURN
50070 IF WZ=21 THEN IF LEN(ZZ$)>
1 THEN FOR CC=LEN(ZZ$) TO 1 STEP
 -1:PRINTCHR$(8);:NEXT:GOTO50000
50080 IF WZ>31 AND WZ<123 THEN 5
0090 ELSE 50010
50090 IF LEN(ZZ$)=>240 THEN SOUN
D 100,1:IF LEN(ZZ$)>254 THEN SOU
ND 100,2:GOTO 50010
50100 ZZ$=ZZ$+WZ$:PRINTWZ$;
50110 GOTO 50010
```

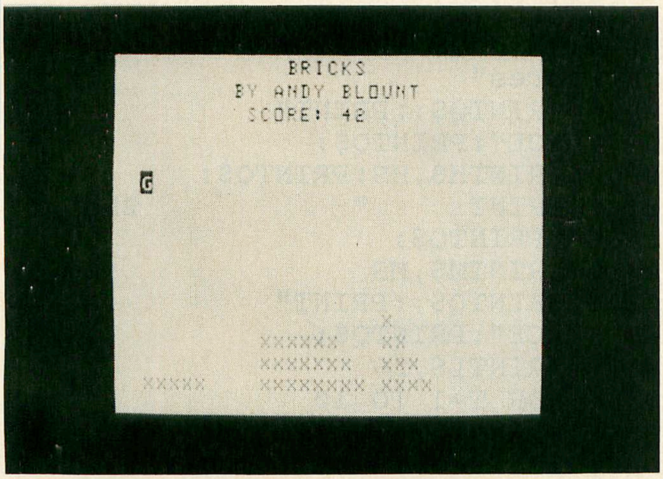
LOGIC **16K ECB**

Masonry Madness

By Andy Blount

Bricks is a Lo-Res puzzle-type game in which you must move a stack of bricks from one side to another. All of the bricks are different sizes and are represented by Xs. Only one brick can be moved at a time and large bricks can't be stacked on smaller ones.

To play the game use the left- and right-arrow keys to move the 'G' and 'P' across the top of the screen. The 'G' represents getting a brick and the 'P' represents placing a brick. To get or place a brick press ENTER and it disappears or appears, if the move is not illegal. The score is tallied by how many moves have been made; the lower the better.



```
           BRICKS
       BY ANDY BLOUNT
        SCORE: 42

 G




                      X
          XXXXXX     XX
          XXXXXXX   XXX
 XXXXX    XXXXXXXX XXXX
```

The listing: BRICKS

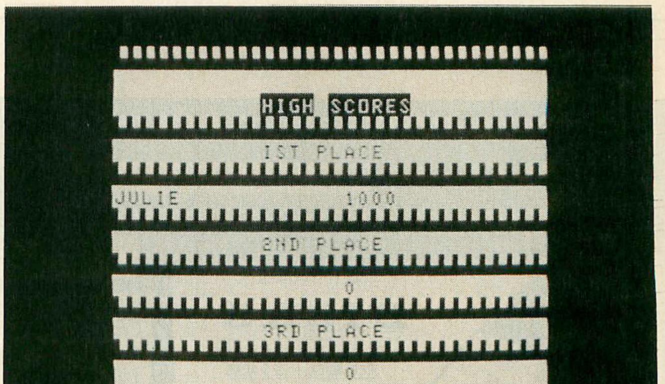
```
10 RP$=STRING$(8," "):FORX=1TO8:
L$=L$+"X":L(X)=X:L$(X)=L$:NEXT:X
$(2)="87654321"
20 CLS:PRINT@13,"BRICKS":PRINT@4
1,"BY ANDY BLOUNT":PRINT@74,"SCO
RE: 0":FORX=0TO7:A$=MID$(X$(2),X
+1,1):PRINT@459-X*32,L$(VAL(A$))
:NEXT:P=1:P$="g":PRINT@162,P$;:P
L=1
30 IN$=INKEY$:IFIN$="" THEN30 EL
SEIFIN$=CHR$(9) ANDPL<>3 THENPRI
NT@162+(PL-1)*9," ";:PL=PL+1:PRI
NT@162+(PL-1)*9,P$ ELSEIFIN$=CHR
$(8) ANDPL<>1 THENPRINT@162+(PL-
1)*9," ";:PL=PL-1:PRINT@162+(PL-
1)*9,P$; ELSEIFIN$=CHR$(13) THEN
IFP=2THEN80 ELSE50
40 GOTO30
50 IFLEN(X$(PL))=0 THEN30
60 P=2:P$="p":N$=RIGHT$(X$(PL),1
):M=VAL(N$):M$=L$(M):PRINT@107,M
$:PR$=LEFT$(X$(PL),1):PRINT@450+
(PL-1)*9-((LEN(X$(PL))-1)*32),RP
$;:MID$(X$(PL),LEN(X$(PL)),1)="
":Y$=X$(PL):X$(PL)=LEFT$(Y$,LEN(
X$(PL))-1)
70 PRINT@162+(PL-1)*9,P$:GOTO100
80 IFLEN(X$(PL))=0 THENX$(PL)=MI
D$(STR$(M),2,1) ELSEN$=RIGHT$(X$
(PL),1):IFM>VAL(N$) THEN100 ELSE
Y$=MID$(STR$(M),2,1):X$(PL)=X$(P
L)+Y$:M$="":M=0
90 PRINT@107,RP$:P=1:P$="g":PR$=
RIGHT$(X$(PL),1):PRINT@450+(PL-1
)*9-((LEN(X$(PL))-1)*32),L$(VAL(
PR$));:PRINT@162+(PL-1)*9,P$
100 SC=SC+1:PRINT@80,SC:IFLEN(X$
(1))=8 ORLEN(X$(3))=8 THEN110ELS
E GOTO30
110 PLAY"O4L10CDEFGAB":CLS:PRINT
"CONGRADULATIONS, YOU SOLVED THE
 PUZZLE IN";SC;"MOVES.":END
```

PROGRAMMING UTILITY **16K ECB**

Settle a Score

By Tio Babich

Joyscore is a utility designed for use in game programming. It allows players to enter first, second and third place high scores using the right joystick.



```
            HIGH SCORES
            1ST PLACE
JULIE              1000
            2ND PLACE
                   0
            3RD PLACE
                   0
```

The listing: JOYSCORE

```
10 CLS3
20 PRINT" USE THIS UTILITY IN YO
UR NEXT     GAME. USE A GOSUB 1000
0 AND       SET YS EQUAL TO THE VA
RIABLE      HOLDING THE PLAYERS SC
ORE.        DELETE LINES 0-9999 AN
D 10010.    FOR A DEMONSTRATION"
31 PRINT"          PRESS A KEY."
32 PRINT"NOTE: THE '&' SIGN ENDS
 INPUT.";
50 EXEC 44539
8999 GOSUB10000
9000 STOP
10000 REM** USE YS AS THE PERSO-
NS SCORE AND USE THIS SUBROUTE
   WITH A GOSUB 10000 ROUTINE.
10005 IF YS<HS AND S<MS AND S<LS
 THEN GOTO 10270
10006 A=0:J=O:I=O
10010 YS=1000
10020 PLAY"L255"
10030 CLS0
10040 A$="ABCDEFGHIJKLMNOPQRSTUV
WXYZ ._&"
10050 Y=10
10060 R$=""
10070 Q$=STRING$(32,196)
10080 PRINT"SELECT LETTERS WITH
JOYSTICK."
10090 PRINT
10100 PRINT@128,A$
10110 J=JOYSTK(0)
10115 IF J>59 THEN J=59
10120 K=INT(J/2)
10130 SET(J,Y,2):PLAY"V5;ABC;V15
":RESET(J,Y)
10135 IF PEEK(65280)=254 AND K=2
9 THEN GOTO 10210
10140 IF PEEK(65280)=254 OR PEEK
(65280)=126 THEN PLAY"ABCDEFG":G
OSUB10160:A=A+1:IF A>11THEN10210
 ELSEPRINT@204,R$
10150 GOTO10110
10160 IF K=26 THEN R$=R$+" ":RET
URN
10170 IF K=27 THEN R$=R$+".":RET
URN
10180 IF K=28 THEN R$=R$+CHR$(8)
:A=A-2:RETURN
10200 R$=R$+CHR$(K+65):RETURN
10210 CLS
10220 T$="":T$=R$
10230 IF YS>HS THEN L$=M$:LS=MS:
M$=H$:MS=HS:HS=YS:H$=T$:GOTO1026
0
10240 IF YS>MS THEN L$=M$:LS=MS:
MS=YS:M$=T$:GOTO10260
10250 IF YS>LS THEN LS=YS:L$=T$
10260 CLS
10270 PRINTQ$:PRINT"            h
igh scores"
10280 PRINTQ$;:PRINT"
IST PLACE":PRINTQ$;
10290 PRINTH$,HS:PRINTQ$;
10300 PRINT      "          2ND
PLACE":PRINTQ$;
10310 PRINTM$,MS
10320 PRINTQ$;:PRINT"
3RD PLACE":PRINTQ$;
10330 PRINTL$,LS
10334 FOR T=1 TO 10
10340 PLAY"L225;V3;ABC;V6;ABC;V9
;ABC;V12;ABC;V15;ABC;V18;ABC;V21
;ABC;V24;ABC;V27;ABC;V30;ABC;V31
;A;V15;L255"
10345 NEXTT
10350 RETURN
```

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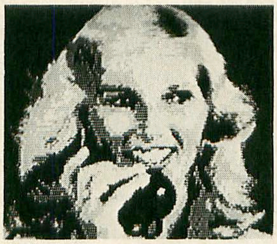
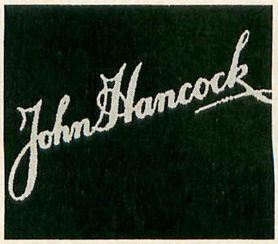


Screen



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3,851	Michael Wolcheski, Meriden, CT
3,478	Rick Busse, Granite City, IL
3,299	Neil Edge, Williston, FL
3,056	Matthew Nelson, Endwell, NY
1,518	Roy Geeo, Hot Springs, AR
AMPHIBIA (THE RAINBOW, 8/85)	
11,200	★Daniel Bisbee, Chesterfield, MA
6,665	David Salvatore, New Kensington, PA
ANDRONE *(Radio Shack)*	
58,200	★Scott Bellman, Bettendorf, IA
57,300	Mitch Hart, Seattle, WA
54,300	Daphnie Phillips, Evansville, WI
53,500	Maurice MacGarvey, Dawson Creek, British Columbia
27,950	Mike Tindall, Manitowoc, WI
ASTRO BLAST *(Mark Data)*	
101,989	★David Salvatore, New Kensington, PA
63,125	Edward Vogel Sr., Pittsburgh, PA
53,950	Bill Fritsch, Whitehall, PA
BATS AND BUGS (THE RAINBOW, 7/84)	
24,600	★Michael Rosenberg, Prestonburg, KY
4,400	Jon Hobson, Plainfield, WI
3,050	Jay Lose, Gulfport, MS
3,000	Michael Scott, Johnstown, NY
2,500	Steven Bullard, Allen, OK
BEAM RIDER *(Spectral Associates)*	
4,969,060	★James Oakley, Nashville, TN
3,042,470	Evelyn Thompson, Nederland, TX
747,200	Robert Eering, Swift Current, Saskatchewan
310,420	Trevor Nagel, Swift Current, Saskatchewan
BLACKBEARD'S ISLAND *(NOVASOFT)*	
65	★Jeff Hillison, Blacksburg, VA
78	Roy D. Grant, Toledo, OH
79	Jeff Roberg, Winfield, KS
BLACK SANCTUM *(Mark Data)*	
106	★Jeff Hillison, Blacksburg, VA
BREWMASTER *(NOVASOFT)*	
451,650	★Martha St.John, Highland Falls, NY
279,600	Alan Drazen, Longwood, FL
216,350	Jean-Francois Morin, Loretteville, Quebec
166,175	Scott Purrone, Roselle Park, NJ
98,875	Chris Cope, Central, SC
BROTAN THE BLUE (THE RAINBOW, 8/85)	
2,534	★Robert Obringer, Wayne, NJ
BUBBLE WARS (THE RAINBOW, 2/86)	
26,900	★Derek Leidig, Clinton, NY
24,400	Daniel Cecil, Bardstown, KY
22,600	Brian McGuire, Golden, CO
21,100	Vincent Neault, Biddeford, ME
14,881	Tandy Carter Jr., Atwater, CA
BUSTOUT *(Radio Shack)*	
37,900	★Gordon Rock, Davenport, IA
21,850	Charles Egglesfield, Sault Ste Marie, Ontario
21,630	Tanya Maestas, Denver, CO
21,236	Mike McCafferty, Idaho Falls, ID
18,403	Chris Zepka, North Adams, MA
BUZZARD BAIT *(Tom Mix)*	
4,455,150	★Paul Rumrill, Gales Ferry, CT
3,091,700	Blossom Mayor, East Greenbush, NY
1,133,850	Rupert Young, Sheffield, MA
980,500	Fruber Malcom, Culpeper, VA
847,400	Gordon Rock, Davenport, IA
152,450	Marc Gagnon, Cap-de-la-Madeleine, Quebec
CALIXTO ISLAND *(Mark Data)*	
166	★Chad Gott, Evangeline, LA
CANDY CO. *(Intracolor)*	
103,306	★Kirk Nedrebeg, Liverpool, OH
CANYON CLIMBER *(Radio Shack)*	
9,988,000	★Brannon Baxley, Live Oak, FL
9,129,100	Gary Mohnsen, Tucson, AZ
1,428,600	Chad McClellan, Rushville, IN
1,347,800	Lucy Dorego, Leamington, Ontario
1,004,000	Brett Fancher, Hooksett, NH
CASHMAN *(MichTron)*	
$45,900	★Gordon Rock, Davenport, IA
31,260	Fred Naumann, Hailey, ID
30,050	Keith Miller, Houston, TX
27,530	Sally Naumann, Hailey, ID
24,920	Edwin Prather, Oxnard, CA
CLOWNS & BALLOONS *(Radio Shack)*	
352,020	★Faye Keefer, Augusta, GA
60,690	Mary Largent, Madison, MS
57,070	Paul Walcott, Mt. Clemens, MI
45,460	Joyce Walcott, Mt. Clemens, MI
40,610	Stephanie Kosara, Monroe, NY
COLOR BASEBALL *(Radio Shack)*	
814-1	★Frank D'Amato, Brooklyn, NY
707-0	●Chislain Chillis, Trois-Rivieres, Quebec
549-0	●Skipper Taday, East Lyme, CT
256-4	Ellsworth Summers, Jacksonville, FL
243-0	●Steve Mutton, Shrewsbury, MA
93-1	Maurice MacGarvey, Dawson Creek, British Columbia
COLOR BLACKJACK (THE RAINBOW, 10/83)	
$15,670	★Wayne Dewitt, Blue Island, IL
7,340	Helen Dewitt, Blue Island, IL
COLOR CAR *(NOVASOFT)*	
107,864	★David Entenmann, Monroe, NY
COLOROUT *(Colorful Software)*	
34,085	★Tim Rueb, Stevensville, MI
COLORPEDE *(Intracolor)*	
3,107,194	★John Ray, Goodlettsville, TN
1,066,000	Keith Queen, Marietta, GA
1,006,000	Gail Queen, Marietta, GA
133,036	Mariano Frausto, Blue Island, IL
59,529	Kevin Radwan, Blue Island, IL
COLOR POKER (THE RAINBOW, 4/83)	
3,241,600	★Earl La Jesse Foster, Lynchburg, VA
CRYSTLE CASTLES *(ThunderVision)*	
850,156	★Michael Brennan, Calgary, Alberta
800,060	Dan Mitenko, Calgary, Alberta
689,751	Edwin Prather, Oxnard, CA
559,380	Jeff Dinger, Edgewood, MD
545,000	Jay Roberg, Winfield, KS
DALLAS QUEST *(Radio Shack)*	
87	★Douglas Bell, Duncan, OK
90	Roy Grant, Toledo, OH
91	John Semonin, Akron, OH
92	David & Shirley Johnson, Leicester, NC
93	Tommy McClure, Doyline, LA
93	Robert Sunderland, Sacramento, CA
DEATH TRAP *(Soft Sector)*	
40,674	★David Entenmann, Monroe, NY
DEFENSE *(Spectral Associates)*	
365,400	★Bob Dewitt, Blue Island, IL
DEMOLITION DERBY *(Radio Shack)*	
104,900	★Michael Davidson, Cartersville, GA
100,900	Scott Lewis, Glide, OR
97,600	Hillel Morris, Chicago, IL
93,500	Keith Tysinger, Asheboro, NC
88,800	Skipper Taday, East Lyme, CT
DEMON ATTACK *(Imagic)*	
64,195	★Jon Ruhnow, Duncanville, TX
57,655	Tracy Salzman, LaSalle, CO
45,775	Mike Watson, Northville, NY
34,990	Skip Freamon, Citrus Heights, CA
32,190	Roger Dingledine, Chapel Hill, NC
DESERT RIDER *(Radio Shack)*	
68,872	★Janine Freamon, Citrus Heights, CA
65,215	Skip Freamon, Citrus Heights, CA
51,519	Michael Lizardy, Oregon, OH
37,912	Kenneth Merkel, Houston, TX
37,550	Keith Miller, Houston, TX
DONPAN *(Radio Shack)*	
20,000	★Rodrigo Maldonado, Whittier, CA
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2,070,460	★Robert Helfers, Sparta, IL
30,330	Ken Dewitt, Blue Island, IL
DOUBLE BACK *(Radio Shack)*	
2,586,300	★Eugene Roosa, Stone Ridge, NY
1,618,400	Diane Guernon, Montreal, Quebec
450,600	Michael Brennan, Calgary, Alberta
32,380	Lorrie Trout, Johnstown, CO
27,000	Roy Geeo, Hot Springs, AR
DOWNLAND *(Radio Shack)*	
68,142	★Cooper Valentin, Vavenby, British Columbia
45,291	Chuck Morey, Bakersfield, CA
38,014	James Pede, Rosedale, British Columbia
37,990	John Siler, Dayton, OH
33,450	Mike Tindall, Manitowoc, WI
31,138	Maurice MacGarvey, Dawson Creek, British Columbia
DRAGON FIRE *(Radio Shack)*	
123,120	★Rupert Young, Sheffield, MA
46,713	Gilles Gagne, Sillery, Quebec
33,676	Nathanael Heller, Kenner, LA
21,221	Jermaine Jackson, Tallulah, LA
19,986	Owen Edson, Sherman Oaks, CA
DUNGEON QUEST *(Computerware)*	
16,985	★Albert Seliger, Lachine, Quebec
DUNKEY-MUNKEY *(Intellectronics)*	
276,900	★Jon Schmidt, Buffalo, MN
216,400	Mark Aberdeen, Delisle, Saskatchewan
198,000	Pat Leathrum, Newark, DE
66,900	Michael Drouin, Reeds Spring, MO
47,300	Esther Cassell, Eastern Passage, Nova Scotia
ELEC*TRON *(Tom Mix)*	
45,890	★Byron Alford, Raytown, MO
40,650	Brad Gaucher, Hinton, Alberta
32,625	John Morris, Rustburg, VA
28,760	Craig Cornell, Greentown, IN
ENCHANTER *(Infocom)*	
185/186	★David Tarleton, Williamsburg, VA
80/115	Scott Bellman, Bettendorf, IA
FALCON'S LAIR (THE RAINBOW, 8/85)	
18,461	★Joyce Smith, Butler, PA
17,463	Michael Scott, Johnstown, NY
15,707	Daniel Cecil, Bardstown, KY
14,627	Alexander Taday, East Lyme, CT
12,497	Dick Teeter, Hawley, PA
9,984	Roy Geeo, Hot Springs, AR
FIGHTER PILOT *(Saguaro)*	
350,450	★Steven Arvay, St. Louis, MO
FIRESTORM (THE RAINBOW, 1/86)	
125,960	★John Gruz, Peabody, MA
4,220	Bobby Shotko, Easton, PA
2,080	Brook Whiffen, Jackson, MS
1,600	Rick Busse, Granite City, IL
FROGGIE *(Spectral Associates)*	
24,360	★Curtis Taylor, Scarborough, Ontario
22,940	Carlton Taylor, Scarborough, Ontario
11,250	Mariano Frausto, Blue Island, IL
7,270	Christopher Taylor, Scarborough, Ontario

SCOREBOARD

5,200 Hiram Esparza, Blue Island, IL

GALACTIC ATTACK *(Radio Shack)*
54,300 ★Cooper Valentin, Vavenby, British Columbia
51,300 Scott Maestas, Denver, CO
33,930 Allisont Iarosis, Owego, NY
30,870 Oren Bergman, Herzlia, Israel
19,410 Ron Volans, Ogdensburg, NY

GALAGON *(Spectral Associates)*
1,306,640 ★Jackie Maddox, Iron Station, NC
520,700 Keith Queen, Marietta, GA
352,000 Gail Queen, Marietta, GA
126,590 Shawn Corway, College Point, NY
49,220 Alice Wasneuski, College Point, NY

GALAX ATTACK *(Spectral Associates)*
26,800 ★Jorge De Albertis, Lima, Peru

GHANA BWANA *(Radio Shack)*
459,930 ★Gene Wells, Silsbee, TX
325,900 Rupert Young, Sheffield, MA
259,960 Steve Wright, Fredericton, New Brunswick
253,960 James Ginn, Laurel, IN
248,540 Byron Alford, Raytown, NO
43,180 Arne Peterson, Lake City, FL

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102,540 ★Greg Erickson, Lowell, MA
80,550 Olga Pichard, Lausanne, Switzerland
76,900 Ghislain Chillis, Trois-Rivieres, Quebec
76,900 Pierre Pichard, Lausanne, Switzerland
72,960 Sylvain Castonguay, Chicoutimi, Quebec

GOLD RUNNER *(NOVASOFT)*
855,250 ★Jesse Sanders, Chimney Rock, CO
760,600 Carmen Izzi Jr., Naugatuck, CT
394,550 Marilyn dePierre, Mascouche Hts., Quebec
350,450 Steven Arvay, St. Louis, MO
274,300 Andrew Reeves, Woodinville, WA

THE INTERPLANETARY FRUIT FLY (THE RAINBOW, 1/85)
37,000 ★Scott Perkins, Port Orange, FL
26,500 Jon Jegglie, Bend, OR
22,000 Steven Bullard, Allen, OK
16,500 Michael Scott, Johnstown, NY

INVASION OF THE FLYING SAUCER PEOPLE (THE RAINBOW, 3/86)
920 ★Michael Clerico, Seaford, NY

JUNIOR'S REVENGE *(Computerware)*
1,100,000 ★Mike McCafferty, Idaho Falls, ID
1,090,000 Brett Bias, Enterprise, AL
1,072,600 Matthew Ramsay, Detroit, MI
969,590 Craig Cornell, Greentown, IN
376,000 Mike Wochek, Bethel, CT

JUNKFOOD (THE RAINBOW, 11/84)
1,504,930 ★Larry Thomson, Menominee, MI

KARATE *(Diecom Products)*
10,900 ★Jim Doyle, Barrackville, WV
4,200 Scott Bellman, Bettendorf, IA

KEYS OF THE WIZARD *(Spectral Associates)*
662 ★John Fulton, Boydton, VA

THE KING *(Tom Mix)*
4,092,600 ★Fruber Malcom, Culpeper, VA
2,134,600 Tim Rueb, Stevensville, MI
1,670,900 Yolanda Farr, Sayre, PA
1,500,800 Kevin Cornell, Greentown, IN
79,340 Kevin Radwan, Blue Island, IL

KLENDATHU *(Radio Shack)*
1,347,020 ★Paul Shoemaker, Quartz Hill, CA
1,177,550 Dan Franzen, Westlake, OH
412,809 Jay Pribble, Davenport, IA
266,362 Brian Ennis, Wilmington, NC
209,825 Gordon Alvarnaz, Taunton, MA

KNOCK OUT *(Diecom Products)*
168,383 ★John Licata, Richton Park, IL
156,875 Rush Caley, Port Orchard, WA
149,190 Daniel Lesage, Laval, Quebec
137,900 John Rogers, Rye, NH
132,465 Kirk Nedrebeg, Liverpool, OH

LANCER *(Spectral Associates)*
209,200 ★Gordon Alvarnaz, Taunton, MA

LEMANS *(Spectral Associates)*
0:57 ★Robert Eering, Swift Current, Saskatchewan
0:64 Trevor Nagel, Swift Current, Saskatchewan
0:73 Chris Wright, Fredericton, New Brunswick

MADNESS AND THE MINOTAUR *(Radio Shack)*
220 ★John Fulton, Boydton, VA

MARBLE MAZE *(Diecom Products)*
36,354,780 ★Melvin Sharp Jr., Baltimore, MD
106,950 Dan Bouges, Niantic, CT
103,560 Stephane Ouzilleau, Lauzon, Quebec
34,330 Brian Biggs, Galloway, OH
33,410 Brett Bias, Enterprise, AL

MEGA-BUG *(Radio Shack)*
18,874 ★Tim Rueb, Stevensville, MI
17,250 Keith Queen, Marietta, GA
14,861 Michael Clerico, Seaford, NY
14,785 Blain Jamieson, Kingston, Ontario
14,241 Scott Swedis, Spencer, MA
12,101 Scott Maestas, Denver, CO
8,314 Maurice MacGarvey, Dawson Creek, British Columbia

MICROBES *(Radio Shack)*
617,950 ★Michael & David Garozzo, Morrisville, PA
161,920 John Guptill, Columbia, MO
17,900 Hiram Esparza, Blue Island, IL

MONKEY KONG *(Med Systems)*
622 ★Krista Cassell, Eastern Passage, Nova Scotia
478 Glen Bilodeau, Otterburn Park, Quebec
365 Mark Ferris, Deep River, Ontario

MONSTER MAZE *(Radio Shack)*
206,780 ★Wanda Jones, Brantford, Ontario
93,890 Rupert Young, Sheffield, MA
60,120 Steve Thomas, Ogdensburg, NY
43,610 Tim Cragg, Kahoka, MO
34,140 Cooper Valentin, Vavenby, British Columbia

MOON HOPPER *(Computerware)*
376,350 ★Rene Ringuette, Riviere-du-Loup, Quebec
102,940 Krista Cassell, Eastern Passage, Nova Scotia
100,410 Craig Cornell, Greentown, IN
80,470 Brett Bias, Enterprise, AL
80,050 Matt Yentes, Urbana, IN

MR. DIG *(Computerware)*
8,987,000 ★Brannon Baxley, Live Oak, FL
6,787,000 Jeff Roberg, Winfield, KS
3,533,650 Paula James, Lumberton, TX
2,261,900 Stephane Ouzilleau, Lauzon, Quebec

MS. MAZE *(Tom Mix)*
12,560 ★George Frausto, Blue Island, IL

MUDPIES *(MichTron)*
77,900 ★Erik Huffman, Rochester Hills, MI
66,700 Kevin Cornell, Greentown, IN

NINJA WARRIOR *(Programmer's Guild)*
108,000 ★Eric Gladstone, Ocala, FL
106,300 Spencer Reeves, Baton Rouge, LA
68,100 Larry Strome, Humboldt, Saskatchewan
60,300 Scott Enman, Belle Mead, NJ
53,200 Mike McCafferty, Idaho Falls, ID
23,320 Vivian Buterin, St. John, MO

NUKE AVENGER *(T&D Software)*
128,125 ★Chris Coleman, Meriden, CT

OFFENDER *(American Business Computers)*
171,900 ★Jorge De Albertis, Lima, Peru

ONE-ON-ONE *(Radio Shack)*
986-22 ★Toby Jacobs, Bellefontaine, OH
970-32 Wes Hill, Vashon, WA
916-34 Todd Amodeo, Winthrop, MA
910-58 Michael Lizardy, Oregon, OH
890-0 •Erik Huffman, Rochester Hills, MI
890-41 Mark Lang, Downieville, CA
434-0 •David Jones, Frostburg, MD
434-8 Kurt Rising, Westfield, MA

OPERATION FREEDOM (THE RAINBOW, 8/85)
73,529 ★Kirby Smith, York, PA
23,347 Ed Westberg, Jensen Beach, FL
19,614 Mary Edwards, Imperial, MO
18,882 Paul Walcott, Mt. Clemens, MI
12,673 Alexander Taday, East Lyme, CT

PANIC BUTTON *(Radio Shack)*
1,120 ★Nathanael Heller, Kenner, LA

PEGASUS AND THE PHANTOM RIDERS *(Radio Shack)*
50,260 ★Rodrigo Maldonado, Whittier, CA

PENGUIN (THE RAINBOW, 2/85)
48,250 ★Paul Wagorn, Carp, Ontario
44,550 Kevin Gallagher, Santa Monica, CA
20,780 George Bodiroga, Eureka, CA
8,470 Joseph Tokarz Sr., Blossburg, PA
1,660 Robert Nicosia, Gloversville, NY

PHANTOM SLAYER *(Med Systems)*
398 ★Marc Gagnon, Cap-de-la-Madeleine, Quebec

PLANET INVASION *(Spectral Associates)*
155,000 ★Jimmy Doyle, Barrackville, WV
126,550 Thomas Mayor, Brooklyn, NY
67,700 Alan Drazen, Longwood, FL
58,650 Ghislain Chillis, Trois-Rivieres, Quebec
39,350 Paul Hotz, Herzlia, Israel

POLARIS *(Radio Shack)*
33,770 ★Gene Murphy, Ft. Worth, TX

POLTERGEIST *(Radio Shack)*
7,430 ★Myriam Ferland, Trois-Rivieres, Quebec
6,000 Billy Fairfull, Charleston, SC
4,840 Steve Thomas, Ogdensburg, NY
4,065 Joseph Tokarz Jr., Blossburg, PA
3,440 Bart Springer, Oskaloosa, IA

POOYAN *(Datasoft)*
3,785,000 ★Ben Collins, Clemson, SC
1,987,000 Jon Sowle, Sanford, FL
1,253,200 Thomas Mayor, Brooklyn, NY
266,300 Pat Leathrum, Newark, DE
250,050 Andrew Reeves, Bothel, WA

POPCORN *(Radio Shack)*
165,180 ★Matt Heinemann, Richmond, VA
116,630 Keith Aschemeier, Napoleon, OH
57,680 Melita Boudreault, Port-Cartier, Quebec
56,500 Bruce Johnson, Vavenby, British Columbia
50,210 Scott Swedis, Spencer, MA
26,760 Lorrie Trout, Johnstown, CO
14,700 Shelly Tumbleson, Johnstown, CO

PRO GOLF *(Computerware)*
69 ★David Esarey, Shelbyville, IN

PROJECT NEBULA *(Radio Shack)*
3,815 ★Christopher Romance, Massapequa Park, NY
150 Mariano Frausto, Blue Island, IL

QUE BIT *(Mike Ro Products)*
53,150 ★Neil Edge, Williston, FL

QUIX *(Tom Mix)*
999,999 ★Wilbur James, Charleston, WV
22,454 Mariano Frausto, Blue Island, IL
16,270 Mark Motel, Blue Island, IL

RACER (THE RAINBOW, 3/85)
301.9 ★Kirby Smith, York, PA
283.4 Jennifer Woland, Silverdale, PA
17.6 Neil Edge, Williston, FL
15.0 Craig Cornell, Greentown, IN
12.9 Robert Nicosia, Gloversville, NY

RADIO BALL *(Radio Shack)*
4,510,740 ★Les Dorn, Eau Claire, WI
1,945,110 Dominic Deguire, St. Basile, Quebec
1,330,500 Sara Grace, Baltimore, MD
1,301,350 Brian Matherne, Gretna, LA
1,060,250 Pat Mulhern, Newark, CA

ROBOTTACK *(Intracolor)*
1,020,800 ★Ian MacLachlan, Bethany, Ontario
931,250 Keith Smith, Bethany, Ontario
637,600 Chad McClellan, Rushville, IN
599,150 Douglas Hauk, Peoria, IL
547,800 Stephane Ouzilleau & Daniel Cloutier, Lauzon, Quebec

ROMMEL 3-D *(MichTron)*
130,300 ★Stephen Charchuk, Yarmouth, Nova Scotia
84,000 Todd Hooge, Comox, British Columbia
68,200 Marc Gagnon, Cap-de-la-Madeleine, Quebec
62,700 Paul Seng, East Lansing, MI
52,700 Alex Seliger, Lachine, Quebec

RUN FOR YOUR LIFE (THE RAINBOW, 4/85)
80,000 ★Brian Jensen, Drayton Valley, Alberta
50,000 Karen Goddard, Oshawa, Ontario
20,000 David Craft, Roanoke, VA
20,000 Ryan Devlin, Louisville, KY
20,000 Brian Voges, Jasper, IN

SAILOR MAN *(Tom Mix)*
879,100 ★Alan Drazen, Longwood, FL
741,100 Bryan Jenner, Calgary, Alberta
587,600 Kevin Cornell, Greentown, IN
567,900 Jon Sowle, Sanford, FL
378,300 Brannon Baxley, Live Oak, FL

SAM SLEUTH P.I. *(Computerware)*

10	★John Fulton, Boydton, VA
SANDS OF EGYPT *(Radio Shack)*	
77	★Jeff Hillison, Blacksburg,VA
SEA DRAGON *(Adventure International)*	
21,200	★George Frausto, Blue Island, IL
19,630	Jorge De Albertis, Lima, Peru
SEA SEARCH *(Mark Data)*	
94	★Bob Dewitt, Blue Island, IL
SHAMUS *(Radio Shack)*	
17,300	★Rodrigo Maldonado, Whittier, CA
16,805	Arne Peterson, Lake City, FL
SHENANIGANS *(Mark Data)*	
90	★Roy Grant, Toledo, OH
95	Jeff Hillison, Blacksburg, VA
95	David Kay, Winnipeg, Manitoba
99	Ed Emelett, Nanticoke, PA
SHOCK TROOPER *(Mark Data)*	
214,203	★Fruber Malcom, Culpeper, VA
150,490	Erik Huffman, Rochester Hills, MI
100,040	Rodney Mullineaux, Gig Harbor, WA
69,328	Gordon Alvarnaz, Taunton, MA
49,438	Alex Seliger, Lachine, Quebec
SHOOTING GALLERY *(Radio Shack)*	
228,610	★Michael Clerico, Seaford, NY
227,840	Cliff Farmer, McGregor, TX
35,000	Bruce Johnson, Vavenby, British Columbia
18,500	Ken Dewitt, Blue Island, IL
9,950	Hiram Esparza, Blue Island, IL
SKIING *(Radio Shack)*	
0:59	★Tim North, Emporia, KS
1:00	Scott Clevenger, Fairmount, IN
1:00	Billy Fairfull, Charleston, SC
1:10	Kevin Gallagher, Santa Monica, CA
1:13	Anthony Perez, Westminster, CA
1:13	Chris Wright, Fredericton, New Brunswick
SKRAMBLE *(Tom Mix)*	
109,280	★Gilles Gagne, Sillery, Quebec
SLAY THE NERIUS *(Radio Shack)*	
294,808	★Joyce Walcott, Mt. Clemens, MI
57,764	Maurice MacGarvey, Dawson Creek, British Columbia
SPACE AMBUSH *(Computerware)*	
398,300	★Alice Wasneuski, College Point, NY
116,820	Shawn Corway, College Point, NY
29,480	Frank Canepa III, Santurce, Puerto Rico
SPACE ASSAULT *(Radio Shack)*	
248,720	★Larry Lockwood, Benton, AR
232,120	Jim Tucker, Commerce, TX
200,300	Scott Swedis, Spencer, MA
24,430	Michael Drouin, Reeds Spring, MO
23,560	George Frausto, Blue Island, IL
SPACE SHUTTLE SIMULATOR *(Tom Mix)*	
555	★Robert Helfers, Sparta, IL
SPEED RACER *(MichTron)*	
145,400	★Brian King, Orlando, FL
142,310	Kevin Cornell, Greentown, IN
142,100	Chris Harrison, Brooks, KY
139,210	Alan Drazen, Longwood, FL
129,950	Jeff Dinger, Edgewood, MD
SPIDERCIDE *(Radio Shack)*	
1,540	★Blake Cadmus, Reading, PA
STAR BLAZE *(Radio Shack)*	
8,400	★John Guptill, Columbia, MO
8,200	Chris Coleman, Meriden, CT
8,100	Curtis Frazier Jr., Enterprise, AL
7,050	Andreas Thaler, Coaticook, Quebec
6,950	Scott Iachetta, Rochester, NY
STARSHIP CHAMELEON *(Computerware)*	
46,600	★Glen Bilodeau, Otterburn Park, Quebec
STELLAR LIFE-LINE *(Radio Shack)*	
78,600	★Don Johnson, Winnipeg, Manitoba
58,580	Stefan Mecay, Austin, TX
37,550	Michelle Wyner, Bloomfield, MI
TEMPLE OF ROM *(Radio Shack)*	
1,422,400	★Timothy Bishop, Jacksonville, FL
959,400	Sonya Hurst, Richmond, CA
938,800	Christopher Romance, Massapequa Park, NY
219,300	Maurice MacGarvey, Dawson Creek, British Columbia
158,400	Blake Cadmus, Reading, PA
TIME BANDIT *(MichTron)*	
1,025,210	★Terry Moore, St. Catherines, Ontario
747,460	Steven Coladonato, Roslyn, PA
619,270	Kristopher Staller, Ft. Wayne, IN
215,810	Mark Olson, Whitecourt, Alberta
106,390	Sylvain Castonguay, Chicoutimi, Quebec
TUBE FRENZY *(Aardvark)*	
125,800	★Shawn Corway, College Point, NY
87,750	Alice Wasneuski, College Point, NY
TUT'S TOMB *(Mark Data)*	
247,800	★Jerry Austin, Baraboo, WI
225,160	Robert Wright, North Queensland, Australia
189,960	Nicole Pouliot Coors, Mobile, AL
189,940	Mike McCafferty, Idaho Falls, ID
121,740	Ed Martinson, Newton, NC
WARP FACTOR X *(Prickly-Pear)*	
12,838,864	★Gordon Alvarnaz, Taunton, MA
WHIRLEYBIRD RUN *(Spectral Associates)*	
117,000	★Jeff Ray, N. Charleston, SC
105,400	Sylvain Castonguay, Chicoutimi, Quebec
54,500	Jay Aust, Marlborough, CT
47,050	Michel LeBrun, Anjou, Quebec
43,850	Glen Bilodeau, Otterburn Park, Ontario
WILLY'S WAREHOUSE *(Intracolor)*	
654,800	★Marilyn dePierre, Mascouche Hts., Quebec
ZAKSUND *(Elite)*	
70,600	★Mike Atwood, Cedar Rapids, IA
ZAXXON *(Datasoft)*	
2,061,000	★Byron Alford, Raytown, MO
1,300,500	Dan Brown, Pittsford, NY
253,400	Bob Dewitt, Blue Island, IL
159,500	Thomas Mayor, Brooklyn, NY
132,300	Roy Geeo, Hot Springs, AR
94,500	Brian McGuire, Golden, CO
ZONX (THE RAINBOW, 10/85)	
21,100	★Phillip Johnson, Scottsville, VA
14,300	Dale Taylor, Chattanooga, TN
13,600	Michael Etchason, Sauk Rapids, MN
6,600	Roy Geeo, Hot Springs, AR
6,300	Jeffry Long, Butler, PA

— Debbie Hartley

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints and tips, we encourage you to share them by sending them to the Scoreboard, c/o THE RAINBOW.

FEEDBACK

Scoreboard:

In response to Donald Dare's letter (May 1986) concerning *Dungeons of Daggorath*, there are five levels. The wizard is on Level 5. I have killed him (and won the game) several times.

You need the Joule and Rime rings plus a certain sword and shield. Those two rings must be "incanted" into their magic forms, though. A dictionary is most helpful!

When you kill the "real" wizard, get his ring, then "incant" it.

Also, in *Pyramid* from Radio Shack, I can only get a few treasures and have found 10 or so rooms. I always get lost in the maze. I found the vending machine, but ended up lost — then dead. Send any help to the "Scoreboard."

Dale Lampe
Sacramento, CA

Scoreboard:

In response to Michael Fischer's letter (May 1986) concerning *Hitchhiker's Guide to the Galaxy*, you also take the toothbrush from Earth. Although you don't always need it, you're better safe than sorry!

You cannot get past the screening door until you're near the end of the game. You should be *very* persistent in going to the Engine Room. Bring the plotter, generator and the Advanced Tea Substitute to the bridge. `PUT BIT IN ATS, PUT SMALL PLUG IN SMALL RECEPTACLE, TURN ON DRIVE` and off you go. If you want the improbability generator to work on the whole ship, then put the large plug in the large receptacle.

Billy Harris
Beaumont, TX

Scoreboard:

Concerning Peter Thorpe's letter (May 1986), I have some advice. First, jump in the back of the jeep and go north. To get out of the mine, go `N`, `E`, `N`, `E`, `S`, `E` and `E`. I assume you know about the translator in the logging camp.

I did get across the river, but only once.

There are some things I was wondering. How do you get the children home? How do you cross the river? And finally, what do you need to complete Chapter One? Send any responses to the "Scoreboard."

Dean Wagner
Avon Lake, OH

AUTOPILOT MODE

Scoreboard:

I have a few tips to pass along to anyone who uses *Flight Simulator I* by Radio Shack. The simulator will land itself in autopilot mode if you set the altitude for zero feet. It will also take off in autopilot if you let the plane reach takeoff speed (160-200), then engage the autopilot.

John L. Whitaker
Hamilton, OH

KEEP YOUR GUARD UP

Scoreboard:

For those who have *Knock Out* by Diecom and are having trouble getting to the champ, this might help.

When starting out with Canvas Kid, put your guard up and wait for him to move slightly, then punch left. You should be able to hit the first guy four times, then wait until he moves again and let him have it four more times with a left punch. You should do this to all boxers except the champ. Remember, though, the higher the rank of the boxer, the less number of times you can hit him.

Phil Levesque
Lewiston, ME

ADVICE FROM THE DEAD

Scoreboard:

In three days I have solved *Dragon Blade* and would like to offer some tips. Although typing "help" in most places only gets you a meaningless response, in two places (both concerning water) it can be very helpful.

To get past the first door you have to follow the advice of the dead man and get your hands dirty. Type `REST` when you reach a restful place.

Throwing a rock at the right place keeps you from getting killed.

In order to get past the stone door, you have to search one other room very carefully.

I do need help on two other Adventures. First, how do you get past the second spider in *Trekboer*? Second, in my *To Preserve Quandic* hint sheet, it tells me to call Kendall when I'm trapped in the room with the keys. But, when I call him he tells me that I'm not in a desperate situation and he won't help. How do I get past this?

Eric Crichlow
Las Vegas, NV

POTPOURRI

Scoreboard:

I am a new reader of this magazine and I want to give some hints.

In *Offender*, always "look" at the top little section instead of the big principal section. By looking at the small section, the game is easier and you will make hundreds of points.

In *Pooyan* (rounds two and four), don't wait for the wolves to come up, or the "thing" on top of you to fall on your head when there are too many wolves on the tree. Instead, start shooting at the coming balloons (with no wolves). Doing this gets you more points.

In *Flight Simulator I*, if you go north from Airport 0, you will find the Tandy Corp. logo picture and by flying north from Airport 2 you will find an 'N' and an arrow showing where the north is. Later, you can find words saying "Flightsim I." By flying east from Airport 0 you will also find the words "Flightsim I" and by flying east from Airport 2 you will find Airport 4 and an 'N' with an arrow telling where north is. Just before you run out of fuel, you will find two mountains with a lake and a river between them.

In *Cashman*, when there are no cats, go up and get all the bombs that are being thrown.

I need help with Section 41 of *Cashman* and Section 3 in *Poltergeist*.

I also need help with *Adventure in Wonderland*, *Dungeons of Daggorath* and *Sands of Egypt*. Send any help to the "Scoreboard."

Jorge De Albertis
Lima, Peru

HOT STUFF

Scoreboard:

I need help with the Adventure game *Trekboer*. It is the first graphics Adventure I've bought and I can't seem to get past the stream of lava to get to the grating on the other side. If anyone can help me please write to the "Scoreboard."

Alvin Cotton Jr.
Fayetteville, NC

TIMELY TIP

Scoreboard:

Many thanks to David Rodriguez's letter (May 1986) about *Dallas Quest*. I had the same problem Jon Olson had. Now that I've gotten through that, I need help getting past the cannibals and into the cave. How do I do this? Any help will be appreciated.

Arne Peterson
Lake City, FL

TRAPPED IN THE COCO ZONE

Scoreboard:

Can anyone help me with Bruce Bell's *CoCo Zone*? (Appeared in RAINBOW, April 1986.) I can't seem to get past the spider and web.

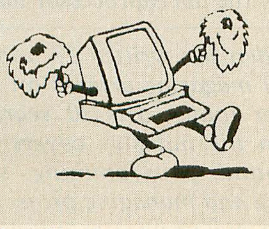
Kim O'Brien
Crestview, FL

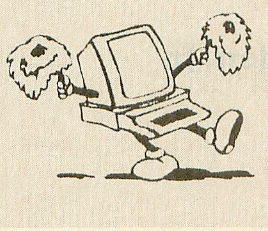
Editor's Note: To escape the tangled web she weaves, a shiny piece of jewelry is what you should leave. Before you arrive though, you'd better take heed, something else shiny, you will also need.

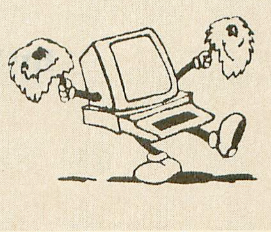
To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

— Debbie Hartley







How Does the CoCo Stack Up?

By William Barden, Jr.

So you plunked down $69.95 and bought a Color Computer on sale and now you're wondering what you've gotten into, eh? Or maybe you've had a Color Computer for a while and you're wondering how the Color Computer stacks up against other computers in the news. Whether you're a new CoCo owner or an old hand, every once in a while I think it's a good idea that we stand back and assess ourselves and our equipment. Just how does the CoCo compare to systems like the Commodore 64, IBM PC*jr*, Macintosh, Atari ST and others? This is not a task for the average CoCo freak — he's simply too chauvinistic, too enthralled with the system for which he spent hard-earned money. I'm also biased, but I think I can separate my bias from the facts. I've been in all types of computing since 1965 — everything from mainframes to micros. Currently I have a Radio Shack TRS-80 Model I, TRS-80 Model II, TRS-80 Model 4, two Color Computers, a Tandy 1000, a Tandy 2000, an IBM PC, an IBM PC*jr*, a Commodore 64 and assorted other smaller computers, like the little-known Timex 2068. Want a perspective about your machine? I think I can do an unbiased job.

Eight Bits, Sixteen Bits, and More

Computer science students love to beat each other over the head with their computer systems the same way they do with automobiles. "My Chevy can take your Ford!" has turned into "My Mac can run rings around your CoCo!" and other insults. When I'm asked what system I have at home, I tell them a Cray X-MP. Since this is a ten million dollar supercomputer, it shuts them up for a while.

Whether you have a CoCo or Cray, though, one of the ways computers are compared is by the size of data processed by the microprocessor inside the

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Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

machine. Our Color Computers have a 6809 microprocessor, which handles data in 8-bit chunks. (A bit, or binary digit, can hold one piece of information, a yes/no or 0/1 piece of data.)

The 8088 microprocessor used in the IBM PC, PC*jr*, and Tandy 1000, among others, is widely touted as a 16-bit microprocessor, but is really an 8-bitter like the 6809. Both the 6809 and 8088 can perform some 16-bit operations, but move data between memory and central processing unit eight bits at a time. The microprocessor used in the Tandy 3000 and IBM AT is a true 16-bit microprocessor, an 80286.

Many other microcomputers use older microprocessors than the 6809 — the Apple II series and Commodore VIC-20 or 64, for example, use a 6502 microprocessor, decidedly an 8-bitter. The Apple Macintosh uses a newer 16-bit microprocessor, a 68000, as does the Atari ST line and the Amiga.

So that puts the Color Computer on a par with the microprocessor used in the Tandy 1000, IBM PC and PC*jr* — about midrange in today's market. The question is, is a 16-bit microprocessor twice as good as an 8-bitter? The answer is not at all. Given a choice between a 16-bitter and an 8-bitter, I'd take the 16-bitter, but I wouldn't expect it to do the job twice as fast. If you've ever seen some of the early Macintosh word processing applications, you'd wonder how such a fast microprocessor can operate so slowly. More important than the microprocessor size is how the system is put together as an entire package — hardware design, software design, operating system and so forth.

To sum it all up, let's give the Color Computer a seven out of a possible 10 for the microprocessor.

The More Memory the Better?

The Color Computer has a maximum memory limit of 65,536 bytes, each byte capable of holding one character of data, or about one BASIC keyword. Not all of this memory is available for user program storage, though. Normally, about half of the memory holds the BASIC interpreter. The remaining 32,768 bytes is an enormous amount of memory compared to minicomputer systems of the 1960s, many of which used only 8,192 bytes to run their programs. However, the 32K (K standing for 1,024) bytes does pale in comparison to the 640K bytes available on the Tandy 1000, IBM PC, and PC*jr*, and the millions of bytes available on more recent systems such as the IBM AT and Tandy 3000. How much memory is really needed?

It really depends upon the task, but generally, the more memory, the better. Part of the reason people clamor so much for additional memory is that applications software packages like Lotus 1-2-3 are memory hogs — they require hundreds of thousands of bytes to run. However, there are many other packages that do not require such huge amounts of memory. Perhaps 90 percent of all software programs will run in a 32K byte system.

Systems like the Commodore 64 and Apple II series have about the same amounts of memory as the Color Computer. However, there's no question that this is one area in which the Color Computer could stand some beefing up. If a new Color Computer is released, we'll certainly see additional memory as an option, perhaps as much as 512K. In the meantime, the Color Computer can run virtually any application, due to the large amounts of software packages available from Radio Shack and outside vendors.

> **"More important than the microprocessor size is how the system is put together as an entire package — hardware design, software design, operating system and so forth."**

Because the Color Computer could use more memory, we'll give the CoCo a three out of a possible 10 on memory.

Good Graphics

One of the nicest things about the Color Computer is its graphics — a maximum of 256 pixels, or dots, per horizontal row by 192 pixels per vertical column, making a total of 49,152 separate dots on the screen, each of which can be one of two colors. Another mode allows 128 by 192 dots in four colors. How does this compare to other systems? At the top of the line is the Commodore Amiga, which has a maximum of 640 by 400 pixels in 16 colors. Next is the Tandy 2000 with 640 by 400 pixels in eight colors. The Atari ST is in this 640 by 400 range. The Enhanced Graphics Adapter of the IBM PC allows 640 by 350 pixels in 16 colors. The Apple II series allows 560 by 192 pixels in 16 colors. The standard IBM PC*jr* is next. The PC*jr* graphics is virtually identical to the Tandy 1000 — 640 by 200 pixels in four colors. The Apple Macintosh has 512 by 342 pixels, but only in black and white. At the bottom of the range are machines like the Atari 1200 series with 320 by 193 pixels and older machines with even less resolution. The Color Computer is in this last category.

You can see that the Color Computer is marginal as far as graphics goes — newer machines are tending towards better and better graphics. Of course, to get the better graphics, you need an expensive color monitor at perhaps $400 extra over the cost of the system. Then there's the fact that 640 by 400 pixels in 16 colors requires a megabyte(!) of memory and a great deal of time to process. The result is a very slow screen update. With 128 by 192 four-color and 256 by 192 two color graphics, Color Computer screen updates can be done rapidly, and you don't need huge amounts of memory to store additional screen pages.

"One-and-a-half million users can't be too far wrong — let's give the Color Computer a nine out of 10 for the user base."

Again, though, I'd have to say that the more screen resolution, the better, even if the full capability of the system isn't realized. Let's give the Color Computer four out of 10 on graphics.

Languages

Most computers have a built-in BASIC language capability — the IBM PC and PC*jr* do, as does the Color Computer. The interesting thing about BASIC is that most versions of it have been programmed by Microsoft, a software company in Bellevue, Washington that got in on the ground floor of microcomputers and has remained a major market force. As a result, Color Computer BASIC (including Extended BASIC) is remarkably like the PC and PC*jr* BASIC in many respects. The `LINE`, `CIRCLE`, and other graphics commands are virtually identical to those used on the IBM PC/PC*jr*. Color Computer BASIC is therefore a strong BASIC that is much more of a standard than BASICs such as Applesoft BASIC or Commodore BASIC.

Currently, the most popular computer languages are BASIC, PASCAL, C, FORTRAN, COBOL and assembly language. All of these are available on the Color Computer via the OS-9 Operating system. OS-9, of course, doesn't come with the system. It's a fairly inexpensive option, however, and you can pick the language or languages you require. The IBM PC and PC*jr* also have all languages available for them, but many of the other systems, especially the newer ones, may not have certain languages. Assembly language is generally available on all systems — I've mentioned the *EDTASM+* product — and other assembler programs are available for the Color Computer as well. Assembly language is a difficult language in which to program, but it produces extremely fast programs.

As far as languages, therefore, I'd have to give the Color Computer a nine on a scale of 10; just about everything you'd want is available, although you do have to use the OS-9 operating system in some cases.

Operating Systems

An operating system controls system resources such as printers and disk drives and it acts as an overseer to control all system operations. Although Disk BASIC is called Disk BASIC, there are many functions in BASIC that would properly belong in the operating system realm; commands like `DIR`, `KILL` and `LOADM`. The intent of Radio Shack was to make a simple operating system, and they succeeded very well — the Disk BASIC operating system commands include most of the common things you'd want to do with any operating system.

In addition to Disk BASIC there's the sophistication of OS-9. OS-9 is a Color Computer form of the Unix operating system, an operating system developed by Bell Telephone Labs and touted as one of the best around. Personally, I'm less enthusiastic than most about OS-9 and Unix. It's sophisticated and versatile, to be sure, but it's not very friendly and hard for the beginner to use. However, I would rank OS-9 above such operating systems as the MS-DOS used on the IBM series and Tandy 1000, 1200, 200 and 3000.

Without OS-9, I'd have to give the Color Computer four out of a possible 10; with OS-9, it gets an eight — one point is taken off because of OS-9's complexity.

The CoCo User Base

It's funny how you can have an exciting computer, but if the system doesn't take off, nobody develops software for it, potential buyers lament the lack of software and delay their purchase or buy another system, and the product may fail. This was the case for many computers over the last ten years or so — computers such as the Timex 2068 and Coleco Adam. One current product for which this may be happening is the Commodore Amiga, which seems a little expensive for the impressive graphics possible on the system.

The base of users for the system, then is very important. It takes sales of hundreds of thousands of systems before the snowball effect works the other way, inducing more and more people to develop software for the system, design system add-ons and produce other related products. Current estimates of sales for the Color Computer are about 1.5 million units! That's not a bad figure, to say the least. For contrast, the IBM PC is one of the best selling computers of all time, certainly in the millions of units. The Commodore 64 and VIC-20 have also sold millions. The Apple MacIntosh has probably sold in he high hundreds of thousands. The IBM PC*jr* has sold in the low hundreds of thousands. Systems such as the Coleco Adam or Timex 2068 have sold only tens of thousands. The Color Computer, then, is toward the high end of sales compared to other systems, but s not the all-time best selling small computer.

With 1.5 million units, however, the CoCo has a plethora of hardware and software products. I'll just mention a few that have blown my socks off. There's *CoCoMax*, a terrific color graphics/mouse program which rivals the Macintosh MacDraw, but in color! There's *EDTASM+*, one of the best assemblers on the market today in terms of interaction with the user and integrating editing, assembling, and debugging facilities. There's OS-9, the professional Operating System for the Color Computer which enables several tasks to be run concurrently on the CoCo and provides more than enough power for even a jaded mainframe user. However, there are a lot of small products too, ranging from the Y cables sold by Spectrum Projects to the neat games of MichTron. The point is, there's a huge user base and a full spectrum of products to support the computer, which you certainly will not find in systems which haven't made the grade.

One-and-a-half million users can't be too far wrong — let's give the Color Computer a nine out of 10 for the user base.

Cost

This is a subject dear to everyone's heart and probably is the biggest single factor in a small computer purchase. At the RAINBOWfest in Palo Alto earlier this year I saw 16K Extended BASIC Color Computers going for $59.95! Those types of prices make the Color Computer a tough system to beat. Another decided plus in favor of the Color Computer is that the system is modular — you can start off with the basic box and then add disk drives and other equipment as you require.

Figuring an Extended Color Computer with a single disk drive, 64K of memory, and color television monitor, the best current price would be about $600. The Atari ST with monitor is about $700. A Tandy 1000, an excellent buy, can be purchased for about $1000 with color monitor. The Commodore Amiga with monitor is about $1400. An IBM PC with a single drive and color monitor is about $1800. The Color Computer, then, is not as dramatically different as you might expect when it comes to price, but it sure is an easy system on which to start off inexpensively, and one that will grow with you.

However, there's another factor in price. Lotus 1-2-3 for the IBM PC costs $300. The Microsoft C compiler for the PC costs $250. Contrast this with the $29.95 for Radio Shack's "Spectaculator" and $99.95 for the OS-9 C compiler on the Color Computer. Just walk through the aisles of any RAINBOWfest to see how inexpensive hardware and software for the Color Computer is.

"Do I like the Color Computer? Somehow it exudes a user friendliness my IBM PC just can't compete with."

Let's give the Color Computer a seven out of 10 on the basis of its bargain prices for an overall system and inexpensive hardware and software add-ons.

To Sum It All Up

At this point we can tabulate the different categories we discussed above. A lot of this, I admit, is somewhat subjective, but I've tried to be unbiased. Here's the scorecard:

Microprocessor	7 out of 10
Memory	3 out of 10
Graphics	4 out of 10
Languages	9 out of 10
Operating System	8 out of 10
User Base	9 out of 10
Cost	7 out of 10

Obviously simply adding up these counts won't give you an absolute figure on how the Color Computer stacks up against the competition. The biggest reason for this is that the criteria above must be "weighted." With some users, cost is a very important factor, with others, the difference between a $3000 Tandy 3000 system and an $600 Color Computer system is no problem at all. Other people run only Lotus 1-2-3 and would like huge amounts of memory for their spreadsheets. Still other owners are into languages such as C and assembly language and want a system that runs their favorite compiler in a friendly environment. Other users want a system with good, inexpensive graphics games for their kids. I'll leave it up to you to determine your own needs and how much weight you'd like to give each factor.

From the comparisons above, though, I think it's fair to draw the following conclusions: the Color Computer is an inexpensive system with inexpensive software and hardware add-ons. The system uses a fairly recent microprocessor that provides adequate computing power. Memory is limited, but large enough to run most applications. While the graphics don't match the graphics of newer systems, they are adequate for most applications and games. The Color Computer has a wide range of languages, a good basic operating system, and a harder-to-use, but powerful, advanced operating system. It's user base guarantees good support from the manufacturer and developers of hardware and software products.

And now for my personal, strictly biased opinion: Do I like the Color Computer? Somehow it exudes a user friendliness my IBM PC just can't compete with. I like the classic lines of the instruction set of the 6809 microprocessor. I even, believe it or not, like the feel of the keyboard. When I see the graphics on such programs as *Sands of Egypt* or *CoCoMax*, I forget that the resolution isn't quite as good as a Tandy 1000. I especially like wandering down those aisles at RAINBOWfests, picking up fantastic bargains on hardware and software. The CoCo will be around for a while in my computing room and I hope in yours as well.

Exploring the Card Catalog

By Steve Blyn
Rainbow Contributing Editor

It is never too early to begin building good library skills. Many public libraries have story hours for children, beginning with the preschool set. There are many skills needed to be able to use libraries to their fullest extent. Children in the elementary grades need continued instruction and guidance in the use of their classroom and school library facilities.

The school librarian or classroom teacher usually helps individuals and groups to select books or to find books related to a particular topic or problem. She sets aside periods in which she tells a story, introduces children to new books and acquaints them with the library setup. She also explains and demonstrates the use of the card catalog.

By the end of the fifth or sixth grade, most students are thoroughly familiar with the organization of the school library. They understand classification of books and library arrangement, use of encyclopedia or reference book letter keys, reference guides, card catalogs and the use of a variety of reference books. These reference books include encyclopedias, atlases, almanacs, yearbooks, telephone directories and newspapers. The students often collect and organize materials for class assignments or their own class library.

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

One skill we feel dominates library use is the card catalog. The ability to properly use it often determines if one can locate the proper material one needs. Some libraries are now using methods other than the traditional card catalog. The newer methods usually are less expensive to the library. Whatever the system, the material it contains is similar.

This month's program will help familiarize students with the information contained on cards from a typical card catalog. An illustration of a typical card is shown. The student is asked to locate the author's last name, the title, the publisher and the number of pages.

Lines 30 and 40 set the dimensions for the number of cards. Lines 50 through 70 read the cards' information from the DATA lines. Lines 80 through 300 ask the questions about the four pieces of information we are looking for. If the answer is correct, a pleasant tune is heard. If incorrect, the correct answer is inserted in the proper place.

The DATA lines contain the cards' contents. They are entered in the following manner: author's last name, author's first name, title of book, illustrator, publisher, copyright date and number of pages.

Please note there is no comma at the end of the number of pages which is the end of the DATA line. Placing a comma here is a common mistake that alters the results desired.

There are currently only five cards in our catalog. You may add an almost endless number of cards if you desire. Merely follow the DATA line pattern started by the program and shown above. Enter your DATA on lines that you create following Line 420. Be sure to adjust the value of 'N' on Line 30 to the new total amount of cards.

We, at Computer Island, hope that you will use and modify this program for your children's needs. It would be a nice experience for the children to assist you in selecting more books to include and in entering the new DATA lines. ☐

```
200 .......34
330 ......208
END ......40
```

The listing: CARD LOG

```
10 REM "CARD CATALOG"
20 REM"STEVE BLYN,COMPUTER ISLAN
D SOFTWARE,STATEN ISLAND,NY,1986
30 N=5
40 DIM A$(N),B$(N),C$(N),D$(N),E
$(N),F$(N),G$(N)
50 FOR T= 1 TO N
60 READ A$(T),B$(T),C$(T),D$(T),
E$(T),F$(T),G$(T)
70 NEXT T
80 CLS5:PRINT@7,"THE CARD CATALO
G";
90 PRINT@32,STRING$(32,204);
100 FOR T=1TO5:PRINT:NEXT T
110 R=RND(N)
120 PRINT@64,A$(R)","B$(R)
130 PRINT@104,C$(R)
140 PRINT@136,D$(R)",ILLUS."
150 PRINT@168,E$(R)
160 PRINT@180,",C.";F$(R)
170 PRINT@200,G$(R);" P.,ILLUS."
180 PRINTSTRING$(32,195);
190 PRINT@256,"AUTHOR'S LAST NAM
E";:INPUT L$
200 IF L$=A$(R) THEN GOSUB 350:G
OTO 220
210 IF L$<>A$(R) THEN GOSUB 360:
PRINT@274,"-";A$(R)
220 PRINT@320,"TITLE";:INPUT T$
230 IF T$=C$(R) THEN GOSUB 350:G
OTO 250
240 IF T$<>C$(R) THEN GOSUB 360:
PRINT@325,"-"C$(R)
250 PRINT@384,"PUBLISHER";:INPUT
 P$
260 IF P$=E$(R) THEN GOSUB 350:G
OTO 280
270 IF P$<>E$(R) THEN GOSUB 360:
PRINT@393,"-"E$(R)
280 PRINT@448,"HOW MANY PAGES";:
INPUT M$
290 IF M$=G$(R) THEN GOSUB 350:G
OTO 310
300 IF M$<>G$(R) THEN GOSUB 360:
PRINT@462,"-";G$(R)
310 PRINT@482,"enter TO GO ON OR
 e TO END";
320 EN$=INKEY$
330 IF EN$="E" THEN CLS ELSE IF
EN$=CHR$(13) THEN RUN ELSE 320
340 END
350 PLAY"L5004CEGEEEGC":RETURN
360 PLAY"O2L100CCC":RETURN
370 DATA SPEARING,JUDITH,GHOSTS,
MARVIN GLASS,SCHOLASTIC,1972,160
380 DATA HENTOFF,NAT,JAZZ COUNTR
Y,CHARLES MINGUS,DELL,1970,143
390 DATA DECK,JOHN,BEYOND TOMORR
OW,RICHARD SANDERS,NOBLE,1970,15
8
400 DATA GRAVES,CHARLES,JOHN KEN
NEDY,PAUL FRAME,DELL,1966,80
410 DATA DAVISON,MICKIE,GEORGE W
ASHINGTON,SEYMOUR FLEISHMAN,SCHO
LASTIC,1957,71
420 REM"YOU MAY ADD MORE DATA LI
NES HERE FOR MORE BOOKS. BE SURE
 TO KEEP THE VALUE ON 'N' ON LIN
E 15 CURRENT."
```

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Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

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...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

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But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

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Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

RAINBOW
CERTIFICATION
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File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor... outstanding in every respect.
— The RAINBOW, Jan. 1982

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The 'Hidden' Computers

By Michael Plog, Ph.D.
Rainbow Contributing Editor

The education industry is comprised of much more than teachers and students. Many people work for education, but never see a classroom, or even a school. Yet, their work is important, and helps to make teachers' jobs more productive. Computers play a role for these people too, and assist in getting an educational product developed and delivered.

One example of such an educational effort is the production of educational television tapes for schools and general public. Preparation of a videotape can be a very simple affair, providing you do not mind a low-quality final product with an amateurish appearance. With a video cassette recorder and a video camera, anyone can take home movies and show them in classrooms. Production of a high-quality tape, however, is an entirely different matter.

Before videotape, preparation of an educational film could also have been a simple affair. Many people owned home movie cameras and took movies. An amateur could even edit the film by looking at each frame of the film, cutting and splicing until the edited version was more acceptable to the audience. With videotape, editing cannot be done with a sharp blade and glue. You cannot simply cut a piece of videotape and attach another piece to it. Electronic editing is required.

Another problem of video editing is school students (and members of the public such as school board members, parents, etc.) have a more sophisticated attitude toward educational video materials than in the past. The quality of the message is often measured by the quality of the medium. We have been spoiled by slick network production, not to mention Sesame Street and other professional material now available for educational use.

Editing a videotape has some similarities to editing celluloid film. A videotape has frames, much like a film has frames. On celluloid film, a single frame is one picture, one exposure of light onto the film. One frame of a videotape is a sweep of the cathode ray gun down the video screen. There are thirty such complete sweeps every second, therefore a video frame is 1/30 of a second. To edit a tape, you need to record the frames wanted onto a new tape. A blank tape is used to receive the images from other tapes. The final recording has to be in the proper sequence, even if that means going backwards on one of the raw tapes.

Every videotape contains the image plus other information. Each frame has room for 80 bits of audio information. Some of that information is used as a time code track. Each frame of video tape has a code that tells the hours, minutes, seconds and frame number. A technician can call up the exact frame of a piece of tape that is two minutes, 14 seconds, and 29 frames from the beginning.

Now we see how to edit videotape. The director can indicate the final tape should begin with the shot happening four minutes, two seconds, three frames after the start of the raw tape, go for 20 frames, then insert the shot that is one hour, eight minutes, five seconds and three frames. This process continues for the entire length of the finished product. This type of editing is much more difficult than cutting a strip of celluloid and physically inserting it at the right place.

There are companies that provide the equipment necessary for such editing. One machine is required to record the final product and, generally, more than one machine is used to provide the incoming source tape, since most people will have more than one reel of tape containing the original information.

Recently, I observed such an operation at the television section of the Illinois State Board of Education. One recording machine was connected to six source tape players. Two other input devices were used to control screen graphics. The editing process was handled by a computer, as you might well imagine. The impressive part of this educational television facility is that a Radio Shack Color Computer is the machine controlling this massive array of complex electronic video equipment. That's right — the little white box from Tandy, almost unnoticed among dials, knobs, blinking lights and huge machines, was the brains of this operation.

The Color Computer has several jobs in this facility. It must first touch and read each of the incoming tape machines and the recording machine. The

---

Michael Plog received his doctorate degree from the University of Illinois. He has taught social studies in high school, worked in a central office of a school district and currently is employed at the Illinois State Board of Education.

computer has to determine if the tape machine is on with a tape correctly inserted and ready to play. The computer provides commands to each of the machines to stop, get ready, play, and most crucial of all, to determine the frame position called for by the director.

The creator of this system, Mitch Hopper, loads up to six tapes, then sits at the keyboard of the Color Computer. He types in a command to record from one of the input machines, beginning at a specified location, for the required length of time. There are hundreds of such commands necessary for one final tape. Each command is also listed to a printer for later verification and tracking of the finished tape.

The computer then goes to the specified input machine, reads the time code, determines how far away (and in which direction) the requested time code is, moves the tape back and forth until it has found the correct beginning spot. The exact frame of the input tape is then noted. To further complicate matters, the electronic devices have a delayed reaction time. A tape machine cannot simply begin playing, it first has to get up to speed then start showing the signals for that frame. Each input machine has a different delay time, meaning the Color Computer has to keep these times straight for every machine.

Finally, the Color Computer must start the machine providing the incoming signal, as well as the recording machine, at exactly the correct time, so the specified frame — not one frame ahead or behind — is recorded on the final product. With thirty frames per second, the job requires the combination of high quality in computer, software and operator.

I was amazed when I found the Color Computer performing this task. I was even more amazed when the man who developed this system said he had written the entire program in BASIC. Machine language would have been faster than BASIC, but would not greatly increase actual speed, because of the time required for a human to change tapes on the machines.

The total material investment in this system was one Color Computer, a tape player for the computer (no need to use disk; the program stays in the machine), and about $250 for a Programmable Peripheral Interface box. The PP contains extra memory and the additional ports necessary for "talking" witl the tape machines. No monitor wa necessary, there were plenty just layin around. After all, this is a facilit devoted to video. Mr. Hopper spent si weeks programming the Color Computer and building the interface device.

It is possible to purchase hardwar and software specially developed fo this type of operation. Such a system t perform the tasks currently done by th Color Computer would cost abou $30,000. Of course, that does not include the time necessary to learn how t operate the equipment.

So, the next time you show a class videotape, or watch something on educational television, think of the peopl behind the production. One of them jus might be an extremely creative perso named Mitch sitting in front of a littl white computer from Radio Shack.

That's all for now. If you have comment or question about this article or any matter related to education an the Color Computer, please contact m at 829 Evergreen, Chatham, Illinoi 62629.

CORRECTIONS

"Wishing Well: Achieving Arcade Game Speed in BASIC" (July 1986, Page 98): Due to a printing error, some lines in the *Trench* listing may be difficult to read. Line 15 should read as follows:

```
15 PMODE3,1:R$="U24C2F2E4F2G4C4N
H3F20L24":DRAW"C4S4BM0,47"+R$:R$
="U24L4C2H2G2F4C4NE3G20R28":DRAW
"BM255,47"+R$:PAINT(3,41),4,4:PA
INT(253,41),4,4:PMODE4,1:RETURN
```

Line 17 should read:

```
17 LINE-(180,20),PSET:LINE-(256,
40),PSET:LINE(76,20)-(0,0),PSET:
LINE(180,20)-(256,0),PSET:PAINT(
10,2),2,2:PAINT(10,20),4,2:PAINT
(246,20),4,2:PMODE4,1:LINE(0,144
)-(256,192),PSET,BF:FORI=1TO65:P
SET(RND(256),RND(66)+30):NEXT
```

"The Old-Time Banner Printer" (May 1986, Page 150): Credit should have been given to Francis S. Kalinowski for portions of the program concept and some of the operating routines that were derived from his original work. We regret this omission.

"Juggle Bills, Juggle Bills, Juggle All the Way!" (March 1986, Page 76): Glen Dufur has written to point out that, although the keybox for the article indicates otherwise, *Homebdgt* is cassette-based and does not support disk.

For quicker service, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` **at the CoCo SIG prompt and** `INFO` **at the Topic? prompt.**

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The Rainbow Bookshelf™

Timing and the SAM Chip

By Tony DiStefano
Rainbow Contributing Editor

As we all know, the CPU in our CoCo is the MC6809E. It is the heart of the computer. It equires RAM and ROM and I/O and Video and so on to help support it. All hese devices must be memory mapped. They must appear somewhere in the 4K bytes of memory the CPU can ccess. The proper timing and sequencng must be within the specifications of he CPU. Normally, a handful of TTL 74 series) logic chips take care of this. n the CoCo one big chip takes care of ll of this and more. The chip is the MC6883, sometimes known as the 74LS783N. The name of this chip is a Synchronous Address Multiplexer or SAM for short. This is a 40-pin chip hat mates the MC6809E and the MC6847 (the video chip). This chip also does all of the dynamic memory refresh iming and memory mapping of all the other major chips of the CoCo. As you can see, this thing is a real workhorse of a chip. By the time I am finished describing this chip, everyone will have as much respect for it as I do.

Tony DiStefano is well-known as an early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.

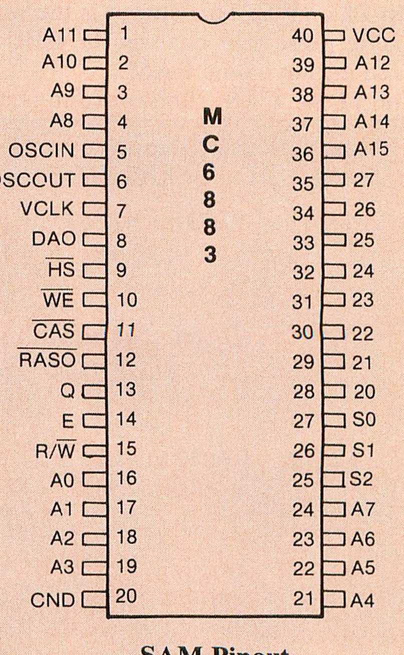
The first part of this article is a pinout of this chip. Figure 1 shows the pinout of the SAM chip. The following is a pin-by-pin description of the Motorola chip number MC6883.

Pin 1 to 4 — A11 to A8. Address lines A11 to A8 respectively from the MC6809E. These are four of the 16 address lines the SAM requires to fully control the memory mapping of the CPU.

Pins 5 and 6 — OSCin and OSCout. These are the crystal oscillator inputs. A crystal and supporting components supply the SAM a master frequency of 14.31818 MHz. This is the highest frequency available in the CoCo.

Pin 7 — VClk. The first function of this pin is to generate an output of 3.579545 MHz. This supplies the color carrier for the VDG (Video Dispay Generator) Clk pin. The second function resets the SAM when this pin is pulled to a logic level of 0, acting as an input. In the CoCo, this pin is part of the reset circuitry.

Pin 8 — DA0 (Display Address 0). The function of this pin as described in the Motorola manual is the least significant bit of a 16-bit video display address. The more significant 15-bits are outputs from an internal 15-bit counter which is clocked by DA0. The second function, not used by the CoCo, is to indirectly enter the logic level of the VDG FS (field synchronization pulse) for vertical video address updating.



SAM Pinout
Figure 1

Pin 9 — $\overline{\text{HS}}$. This input, connected to the $\overline{\text{HS}}$ output of the VDG, detects the falling edge of the pulse in order to initiate eight dynamic RAM refresh cycles. It also resets four least significant bits of the internal video address counter.

Table 1 SAM Control Registers

Address	Mode	Label	Name	Descriptions
FF DF	S	TY	map type	1 = all RAM 0 = ROM/RAM
FF DE	C			
FF DD	S	M1	memory size	00 = 4K 01 = 16K 10 = 64K 11 = static RAM
FF DC	C			
FF DB	S	M0		
FF DA	C			
FF D9	S	R1	CPU rate	00 = slow 01 = dual speed 11 = fast
FF D8	C			
FF D7	S	R0		
FF D6	C			
FF D5	S	P1	page #	SET = PAGE #1 CLEAR = PAGE #0
FF D4	C			
FF D3	S	F6	display offset	start of display address and 512 byte offset
FF D2	C			
FF D1	S	F5		
FF D0	C			
FF CF	S	F4		
FF CE	C			
FF CD	S	F3		
FF CC	C			
FF CB	S	F2		
FF CA	C			
FF C9	S	F1		
FF C8	C			
FF C7	S	F0		
FF C6	C			
FF C5	S	V2	VDG MODE (SAM)	
FF C4	C			
FF C3	S	V1		
FF C2	C			
FF C1	S	V0		
FF C0	C			

Label	DMA	GGR/C	G3R	G3C	G2R	G2C	G1R/C	TEXT
V2	1	1	1	1	0	0	0	0
V1	1	1	0	0	1	1	0	0
V0	1	0	1	0	1	0	1	0

S = set C = clear

Pin 10 — $\overline{\text{WE}}$. This output is the write enable pulse that enables the CPU to write into dynamic RAM.

Pin 11 — $\overline{\text{CAS}}$. This output is the Column Address Strobe. It strobes the most significant 6, 7 or 8 address bits into dynamic RAMs.

Pin 12 — $\overline{\text{RAS0}}$. This output is the Row Address Strobe 0. It strobes the least significant 6, 7 or 8 address bits into dyamic RAMs in Bank 0.

Pin 13 — Q. This output is the Quadrature clock used by the CPU that leads the 'E' clock by about 90 degrees.

Pin 14 — E. This output 'E' clock, bett known as the Enable clock, is used the CPU. It is the main CPU timing a is also used by most peripherial devic This clock determines the speed which the CPU operates.

Pin 15 — R/$\overline{\text{W}}$. This input is fed fro the CPU's R/$\overline{\text{W}}$ line. It tells SA whether the CPU is reading or writi data to memory, writing to the SA registers or device 0.

Pins 16 to 19 — A0 to A3. Address lin A0 to A3 respectively from t MC6809E. These are the next four the 16 address lines the SAM requir to fully control the memory mapping the CPU.

Pin 20 — GND. Return ground for t five volts. Signal ground to which a signals are referenced.

Pins 21 to 24 — A4 to A7. Address lin A4 to A7 respectively from th MC6809E. These are the next four the 16 address lines the SAM require to fully control the memory mapping the CPU.

Pins 25 to 27 — S2 to S0. S2 is the mo significant bit of the three device sele bits. The binary value of these three pi selects one of eight chunks of CP memory map, device 0 to 7. Varying i length, these chunks provide chip s lects for three ROMS, RAM, three I O areas and boot area; the boot area not used in the CoCo.

Chunk Name	Mapped Area	Description
S0	\$0000 to \$7FFF 0 to 32767	This area in a 64K machine is 32K of user RAM.
S1	\$8000 to \$9FFF 32768 to 40959	This area is occupied by the 8K Extended BASIC ROM chip.
S2	\$A000 to \$BFFF 40960 to 49151	This area is occupied by the 8K Color BASIC ROM chip.
S3	\$C000 to \$FEFF 49152 to 65279	Normally this area is occupied by the 8K Disk ROM chip, but this area can access up to 16K.
S4	\$FF00 to \$FF1F 65280 to 65311	This area is 32 bytes long. Four bytes are used for a PIA to which the keyboard HS, VS and audio select are connected.
S5	\$FF20 to \$FF3F 65312 to 65343	This area is also 32 bytes long and again only four bytes are used for a PIA to which the VDG controls, D/A, cassette motor, RS-232 and interrupts are connected.
S6	\$FF40 to \$FF5F 65344 to 65375	This 32-byte area is used with a disk controller to control things like drive select, FDC control and drive motors.
S7	\$FF60 to \$FFDF 65276 to 65503	This is not used except for the SAM control registers.

Table 2

ns 28 to 35 — Z0 to Z7. These are the ght multiplexed address lines needed access 64K dynamic RAM. With 16K namic RAM, only Z0 to Z6 are used d Z7 is $\overline{RAS1}$ for a second bank of K chips. With 4K dynamic RAM, Z6 not used. These lines are also used to nerate the video address refresh on e alternate 'E' cycle.

ins 36 to 39 — A15 to A12. Address es A15 to A12 respectively from the C6809E. These are the last four of the address lines the SAM requires to lly control the memory mapping of e CPU.

in 40 — Vcc. This pin requires +5 olts. It powers all the functions in this ip.

As you can see from these descriptions, the SAM chip and VDG chip are osely linked. The SAM chip generates ata from its RAM and delivers it to the DG. That is one of the functions of the AM. It works closely with the VDG onitoring the horizontal and vertical yncs in order to give it the proper data at the VDG later converts to a video ignal. The SAM has many modes in hich it delivers video data to the VDG. hese modes are selected by a set of egisters in the SAM's memory map. ut since the SAM chip has no data ines going to it, the registers are accessed by writing to odd address locaions to set the register and writing to ven address locations to clear the egister. The data written to these ocations is irrelevant. Table 1 shows all he SAM control registers and their unctions. Most of the registers shown re used with the VDG.

Pins S0 to S2 are used to decode hunks of memory. These so-called hunks of memory are what memory naps the CoCo into what we know it o be. For instance, BASIC is one chunk hat is 8K long. Disk Extended BASIC is another chunk that takes up 16K. These eight chunks are decoded from the three pins by using a 74LS138. You might remember this from a past article, but if you don't, a '138 is a three-input to eight-output decoder; just what the doctor ordered. Each one of these eight outputs controls one chunk of memory. Table 2 shows all eight chunks and describes where in the memory map they appear and what use each has in the CoCo.

In Table 2, notice that part of S7 are the SAM control registers. Table 1 describes the SAM control registers. The SAM control registers are divided into six areas. The following is a description of each of these areas.

The first area is the map type. When cleared, the SAM is in the map type 0. This is the mode that BASIC sets it up to be. The ROMs are active and a maximum of 32K RAM is accessible. When set, the SAM is in the map type 1. This mode is better known as the 64K mode or the RAM mode. In this mode none of the ROMs are active but all 64K RAM is accessible. The OS-9 operating system uses this mode.

The next mode is the memory size. The SAM can use three types of dynamic memory, 4K, 16K and 64K. When your CoCo is first turned on, a routine in the BASIC ROM checks to see what kind of RAM is installed and sets the SAM chip accordingly.

The third mode is CPU rate. The SAM has some control as to the speed at which the CPU can operate. It has three choices; the first is called slow. In this mode the CPU runs at .894 MHz. The next is the dual speed mode. Depending on where the CPU is accessing memory, it can access it at .894 MHz or at the faster 1.78 MHz. At the dual speed, S0 and S4 are accessed at the slower speed, all other accesses are at the higher speed. The third speed is the fast speed. This is where all accesses are done at the high speed, but at that speed, the SAM chip does not have the time to do video. The video screen displays garbage.

The fourth mode is the page mode. When the SAM is in map type 0 and is using 64K memory chips, only half, 32K, of memory is used. The other half is just sitting unaccessible. Setting this register switches in the other half of memory and switches out the first half.

The fifth mode area is a big one in that it takes up a lot of room. This is the display offset. This offset tells the SAM chip where in memory to start the video scanning. Since the smallest memory area the SAM can scan is 512 bytes, all offsets are 512 bytes apart. The display offset is a binary address to the start of the video display.

The sixth area is the VDG mode. Since graphics pages take up more memory than text, the SAM has to scan more memory. The amount of memory scanned depends on the graphics resolution mode required. Basically there are three amounts of graphics memory. The first is 1.5K memory, the second is 3K and the highest is 6K. These modes of graphics must match the graphics mode the VDG is set to. You will find more detail on these modes in the BASIC manual supplied by Radio Shack.

The last mode is reserved for future use. Who knows what Motorola has in store for these unused registers.

The SAM chip is a very complex chip, indeed. I have just described only the major parts of this chip. Complete details on this chip are available from your Motorola dealer. The details I have given are taken from that manual and the TRS-80 Color Computer Technical Reference Manual, available at your local Radio Shack store.

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PICKS FOR YOUR POCKET Specialized Systems Consultants Inc. has announced its latest edition to its line of pocket references. The *Text Processing Reference* is a guide to UNIX word processing tools and includes coverage of the mm macros and the tbl, eqn, nroff and troff commands. The 32-page guide sells for $6. Other pocket references offered by SSC are *UNIX Command Summary*, *C Library Reference for Standard System V*, *MS-DOS Command Reference*, *FORTRAN 77 Reference* and the *VI Reference*. ***Contact Specialized Systems Consultants Inc., P.O. Box 55549, Seattle, WA 98155, (206) 367-UNIX.***

IMPROVEMENTS Tandy Corporation has announced that consolidated sales and operating revenues for the month of May were $245,108,000. This is an increase of 12 percent over the May 1985 revenues of $219,074,000. Tandy's U.S. retail operations recorded a 10 percent May gain over that same period in 1985. In May 1986, recorded sales and revenues for U.S. retail operations were $195,414,000 while May 1985 sales were reported to be $177,112,000. Revenues from U.S. stores in existence more than one year increased slightly in May 1986. Keep it up Tandy!

ADDITIONS Black Box Corporation has issued the second edition of its personal *Black Box*(R) *Catalog*. The new catalog offers 20 percent more items than the previous issue. New product lines include data acquisition products, software to serve as management tools and several reference books on the personal computing field. Also included in the 88-page, full-color catalog are cables, switches, test equipment, tools, modems, spoolers, protocol converters and terminal emulation boards. Subscription to the catalog is available at no charge by writing: ***Personal Black Box(R) Catalog, P.O. Box 12800, Pittsburgh, PA 15241, or by calling (412) 746-5500.***

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WANT TO GO OUT? Internationa Resource Development Inc. has give us some insight into the future of datin The firm is predicting that by 199 singles bars around the world will b equipped with computerized card read ers to help their customers meet "com patible" companions. According t Matthijs Moes, who led the study effor customers will carry special identifica tion cards — about the same size a credit cards — and the terminal/reade in the bars will read the informatio into a small computer. The compute will compare personal attributes an indicate to the customer who else in th bar might have compatible interests The customer will have to take it fron there. The cards will give a whole ne meaning to the term "personal" computer, says Moes.

On a related note, IRD says medica cards, similar to the dating cards, wil be introduced first. These cards wil contain all-important medical historie of the carrier. This information will hel in processing insurance claims and more importantly, speed necessar attention to the ill. Blue Cross/Blu Shield of Maryland announced last yea that it had given Canon a contract fo $40 million to produce some 60,00 reader/writer terminals over a five-yea period.

EXPERIMENTER'S DELIGHT OWI Inc. has expanded its Movit family of educational robot kits to include the WAO. This robot is designed to teach the fundamentals of computer programming (e.g. flowcharts), perform graphics and develop an awareness to robotics. WAO has an internal microcomputer chip. The system stores a program in ROM (2K) and will store a user program in RAM (128 x 4 bits). With its built-in RS-232 interface, the WAO is ready to communicate with most personal computers. WAO is sold in kit form and requires assembly. The electronics, however, come pre-assembled and tested. Suggested retail for WAO is $99.95. ***Contact OWI Inc., 1160 Mahalo Place, Compton, CA 90220, (213) 638-4732.***

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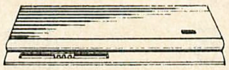

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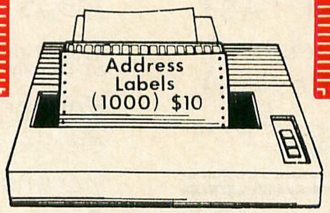

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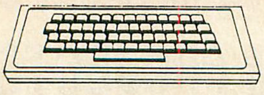

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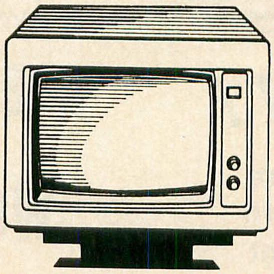

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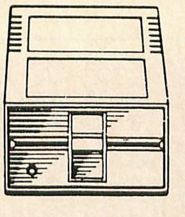

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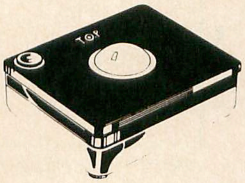

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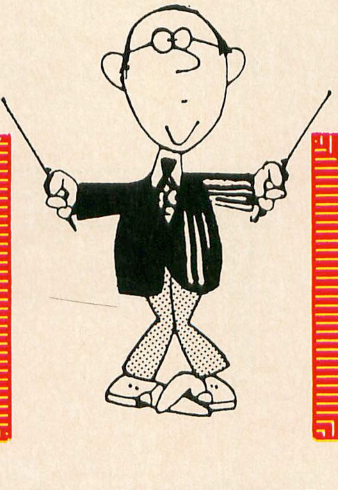

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HARDWARE PROJECT

With this handy joystick port switchbox, CoCo can pull off . . .

THE OLD SWITCHEROO

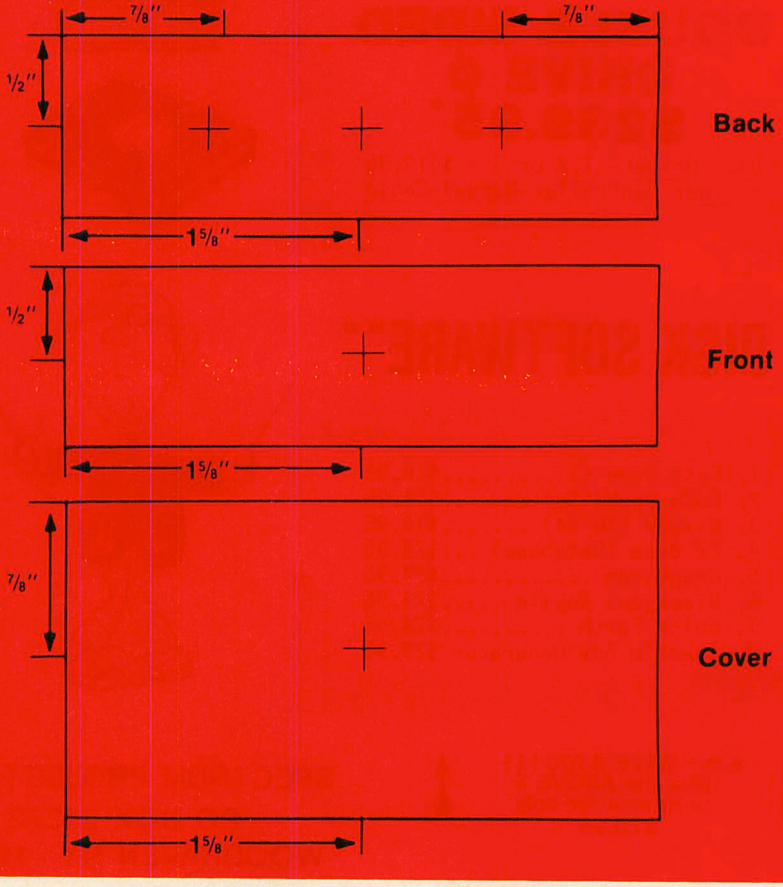
By Mark Haverstock

The Color Computer owner has a multitude of control devices to choose from. Several varieties of joysticks, trackballs, touchpads and mice are available to help us draw, play and create. However, the Color Computer can only accommodate one device at a time in each of its joystick ports. Likewise, the hardware component of the popular graphics program *CoCo Max* only offers a single plug-in socket.

If you've ever had to reach behind the computer to plug and unplug joysticks, or have wanted to change drawing devices in *CoCo Max*, you'll appreciate the Stick Switcher. Armed with a few parts and tools, you can build this convenient switchbox for selecting up to three different devices on one joystick port. An off positon is also included. It allows all the control devices to be disconnected from the joystick port.

Mark Haverstock is an English and reading teacher for the Boardman Schools in Youngstown, Ohio, and is involved in computer and media projects at the middle school level. His hobbies include computing, photography and amateur radio.

Figure 1: Layout for Drilling Box (to scale)



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SPECTRUM FONT GENERATOR

Now you can write files using any CoCo Word Processor (Telewriter-64, VIP Writer, etc.) and convert them to special Highly Detailed character sets! Some of the character sets supported are Italics, Old English, Futuristic and Block. A character set editor is included to create custom sets or modify existing ones! Supports most dot-matrix printers! DISK **$29.95** (see Dec '85 Rainbow Review)

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COCO TEXT UTIL

Includes utilities that most CoCo word processors (TW-64, VIP Writer, etc.) leave out! Reset margins to correct length for uploading, convert all UPPER CASE text to mixed upper/lower, display total BYTE count, EASY rename & kill functions! DISK **$19.95** (see May '86 Rainbow Review)

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Finally! At last! A "SUPER DUPER" utility software package all rolled up into ONE!!! Includes such great utilities as: CoCo Disk Zap, Disk Encryption, Disk Mailing List, EZ Disk Master, Graphics ZOOM, Banner Creator, Function KEYS, Super INPUT/LINEINPUT, Basic Program PACKER, Alpha Directory, Basic SEARCH and much, much more!!! 32K DISK **$29.95** (see June '86 Rainbow Review)

COCO CALENDAR

Get organized for '86 TODAY with the CoCo Calendar! Designed for recording the entire year's occassions and daily appointments so you can plan ahead. You can store HUNDREDS of entries and our GRAPHIC Calendar will show all MEMOS! 32K DISK **$19.95** (see Mar '86 Rainbow Review)

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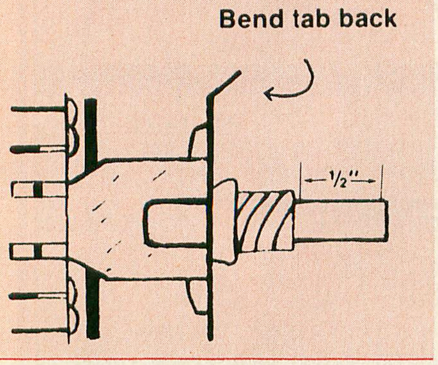
This is particularly important for programs that are adversely affected by having joysticks plugged in during operation.

You will need the following parts: One 6-pin DIN plug, #274-020; three 6-pin inline DIN jacks, #274-021; an experimenter box, #270-2301; a two-pole, six-position switch, #275-1386; one knob, #274-407; five feet of five-conductor stranded wire; dry-transfer lettering; epoxy; and electrical tape or shrink tubing.

The tools needed include: a drill, ¼-inch and ⅜-inch drill bits, flat metal file, small screwdriver, small Phillips screwdriver, wire strippers, pliers, soldering iron and solder, and a hacksaw.

Figure 2: Switch

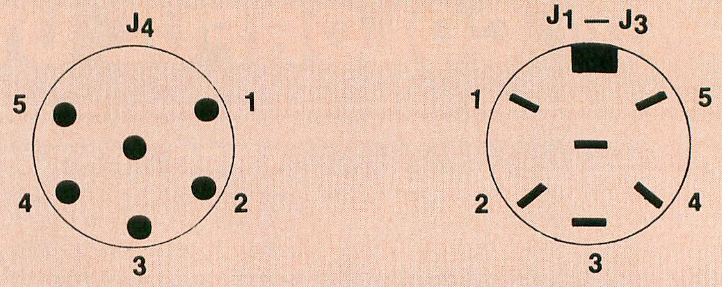


Construction

First, take the metal cover off the project box by removing the four Phillips screws at each corner. Mark the positions of the holes to be drilled on the plastic bottom of the box (see Figure 1). Then drill these holes using the ¼-inch drill bit. Use the file to remove any burrs from the inside of the box.

Mark the position of the switch mounting hole on the metal cover. Drill this hole using a ⅜-inch drill bit. Again, remove any burrs from the rear of the cover. To mark the switch positions on the box cover, you need to temporarily install the switch and knob. Prepare the switch by sawing off all but a half inch of the shaft. File the rough edges after cutting. Find the locking tab and bend it down so it is even with the top surface of the switch (see Figure 2). Mount this switch on the metal cover using the hardware provided and tighten gently with the pliers. Then attach the knob to the switch shaft. Rotate the knob, marking positions 1, 2, 3 and off lightly on the cover with pencil. After these have been marked, remove the switch and knob. Apply the dry-transfer lettering at these positions.

Figure 3: Plugs/Jacks Wiring (rear view)

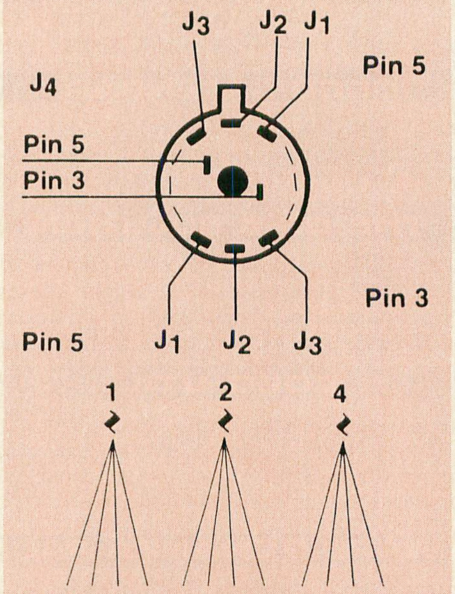


274-020
Plug

274-021
Inline Jack

The next step is to wire the cables and jacks. If five-conductor cable is not available in your area, substitute five #22 gauge stranded wires twisted together, or use the wire from an old broken joystick. Prepare one 36-inch and three five-inch cables by removing one inch of the outer jacket and stripping ¼ inch of insulation from each individual wire at both ends. Remove the covers from the jack and plugs and solder these wires as shown in Figure 3. Before replacing the covers, be sure to inspect the solder connections for shorts.

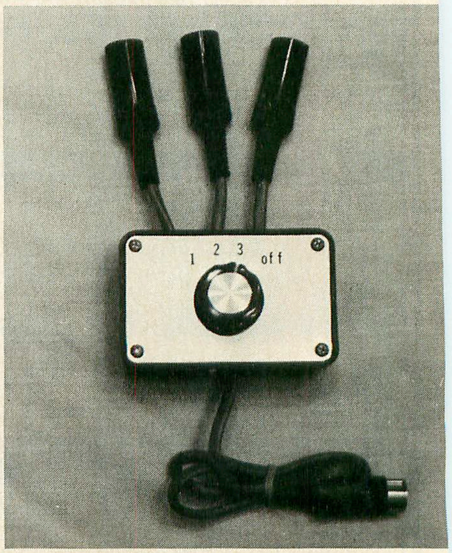
Figure 4: Switch Wiring Diagram



Match remaining wires from pins 1, 2 and 4. Twist each group together, solder and insulate with electrical tape.

Insert the remaining ends of the wires from the plugs into the three holes in the rear of the project box and the wire from the jack into the front. Wire the switch according to Figure 4. Note that only two of these lines will be switched: the +5V and ground lines. The others will be matched, soldered together and covered with electrical tape or he shrink tubing.

To secure the wires attached to J1-J and keep them from pulling out of th box, apply a small amount of epoxy the point where these wires enter th inside of the box. Allow the epoxy t dry thoroughly before going to the next step.



Fasten the switch to the metal cover and align the knob with the positions marked on the metal cover. Be aware that only the first four positions of the switch will be used.

Finally, reassemble the box, being sure to tuck the wires carefully inside. As a finishing touch, you may want to cover the dry-transfer letters with clear nail polish to keep them from rubbing off. To test, simply plug the switcher into a joystick port and add your joysticks or other control devices in positions 1, 2 and 3. You can now enjoy the convenience of switching without unplugging.

(Questions about this project may be directed to the author at 6835 Colleen Drive, Youngstown, OH 44512. Please enclose an SASE for a reply.)

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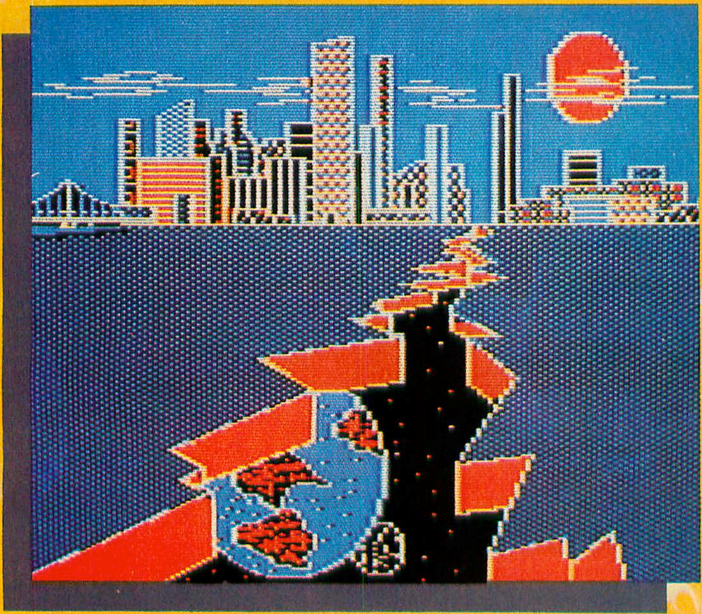
The CoCo Gallery

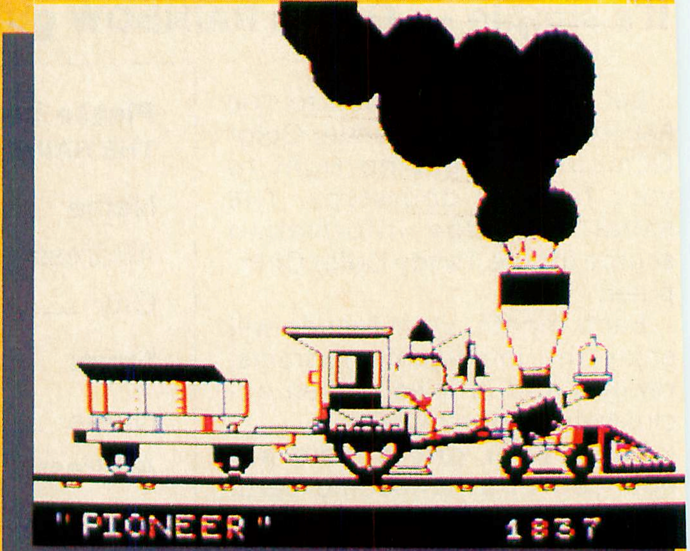


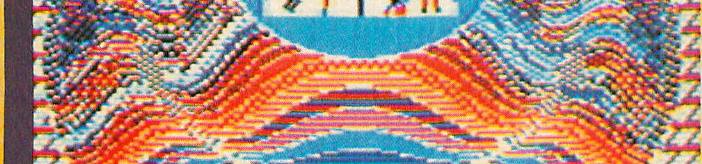
1st PRIZE

Todd Larsen
Where Worlds Meet
Parallels of planets through a saw-toothed fracture initiate this month's gallery. Todd lives in Mobile, Alabama, and created his worlds with *McPaint*.

2nd PRIZE

C.W. "Harry" Harriman
Pioneer 1837
Sauntering back through history garners second prize for Harry, who lives in Bradford, Massachusetts. He used BASIC to create this memorable train.



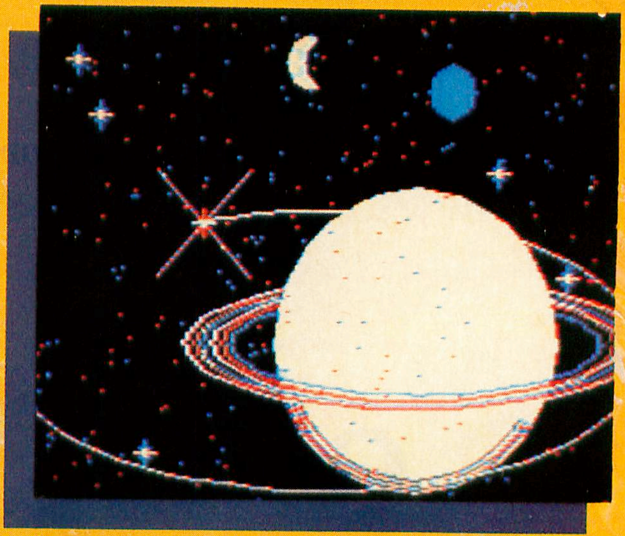


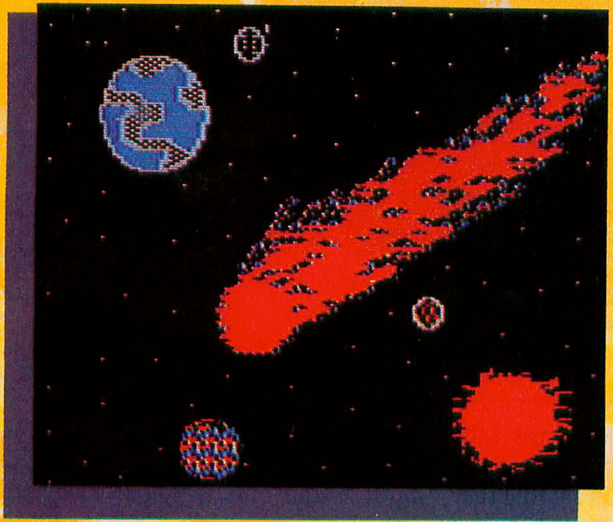
3rd PRIZE

Charlie Fulp
Basketball Zone
Using *CoCo Max*, Charlie presents the gallery with an encompassing view of the all-American sport of basketball. Charlie lives in South Boston, Virginia.

HONORABLE MENTION

Seth Williams
Saturn
From Benson, Arizona, Seth used BASIC to enhance the planet Saturn for the patrons of the gallery.



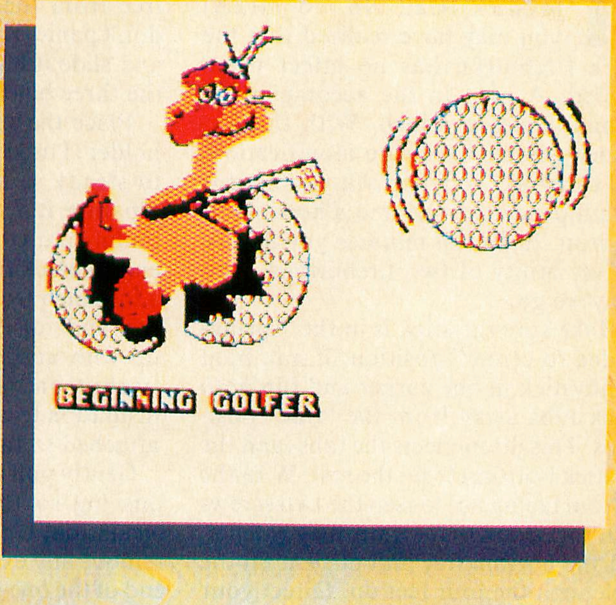


HONORABLE MENTION

James Farmer
Comet
With Halley's Comet in his thoughts, James, who lives in Charleston, South Carolina, used *Micro Illustrator* to create this fiery panorama.

HONORABLE MENTION

Robin Moulder
Beginning Golfer
Robin enlightens the gallery with this humorous caricature for the novice golfer, created with *CoCo Max*. Robin lives in Stone Mountain, Georgia.



SHOWCASE YOUR BEST!

You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community!

Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere.

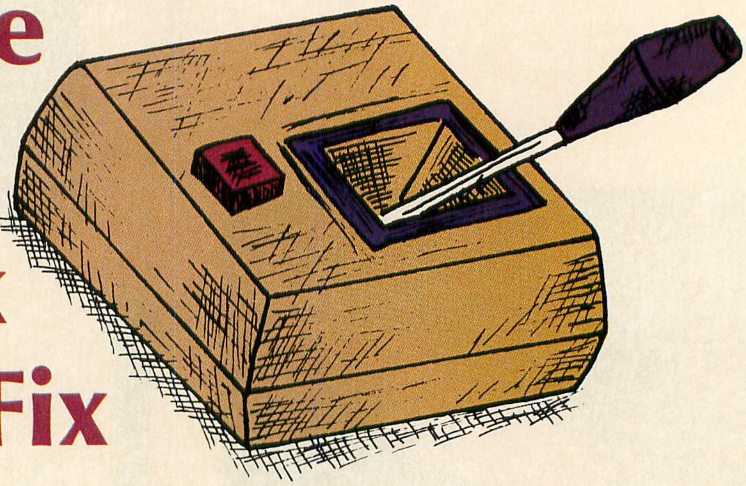
We will award a first prize of $25, a second prize of $15 and a third prize of $10. Honorable mentions will also be given.

— Jody Doyle, Curator

Send your entry on either tape or disk to:
CoCo Gallery
THE RAINBOW
P.O. Box 385
Prospect, KY 40059
Attn: Jody Doyle

Make your deluxe joystick firebuttons electrically parallel

The Quick Joystick Fix



By Bruce W. Goshorn

If you own a Radio Shack deluxe joystick (Cat. No. 26-3012A) you may have realized that the black firebutton has no effect when pressed. A note in the accompanying manual states as much. With this extremely simple hardware modification, you can make it better. All you need is a Phillips screwdriver and a hot soldering iron. In fifteen minutes you'll have the versatility of two firebuttons. And away we go.

Make sure the stick is in the "spring-loaded to center" position. If not, hold the joystick in one corner and flip *both* black tabs away from the "free" positions. This disconnects the tabs (and the joystick bottom) from the rest. With the bottom facing up, loosen the two screws with the screwdriver until they ratchet. Lift the bottom free and place it on the table with the four feet up. Direct your attention to the top portion. If you fumble it and the stick assembly falls free from the upper part of the case, don't panic. Keep the assembly together and slide it back into the slots between the three black posts.

Place the stick down into a suitable holder (I used a roll of bathroom tissue) to steady it. Locate the blue wire and separate it from the rest by carefully pulling it up to a gentle loop from cable end to black firebutton. Measure about a half inch from where it exits the cable end and cut it in two. You should end up with an inch or so attached to the firebutton. Strip a quarter inch of insulation from it. Notice the white wire attached to the red firebutton lug.

Gently pull all other wires away from this lug so the iron won't melt their insulation. Unsolder the white wire and remove any excess solder. Twist the free end of the one-inch blue wire around the free end of the white wire when it's cool and solder these together. Resolder the lug where the white wire came from and let it cool. Now solder the white-blue combination to the lug. Press the other wires down between the stick assembly and the black button. Make sure there are no wires over the post in the corner.

With the cable pointing away from you, pick up the bottom case and, with the catalog number away from you and both X and Y tabs flipped away from their "free" positions, place the bottom case on the top part, align and tighten the two screws. You're ready to test.

Power up the CoCo. At the prompt, press a few random keys. Press the red firebutton and try to type. There should be no response. Release the red button and press some keys. Letters should appear. Repeat this procedure with the black firebutton. Response should be the same. Incidentally, if the CoCo won't take input from the keyboard, you probably have a stuck firebutton. Unplug the joystick(s) and, if normal operation returns, replace or repair the offending joystick.

Your firebuttons are now electrically parallel. Use the one most convenient for the particular application.

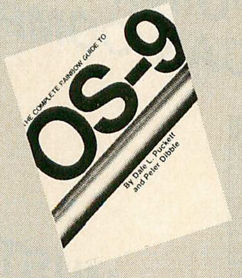
I've always believed that even the best things can be better, and this stick is the best yet. I hope you enjoy your new hardware.

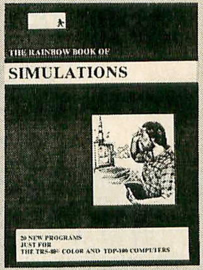
(*Questions about this project may be directed to Mr. Goshorn at 1423 Wyoming Court, Orange Park, FL 32073, 904-276-2327. Please enclose an SASE when writing.*)

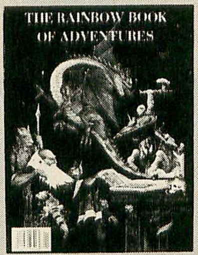
Bruce Goshorn is a U.S. Navy Ordnance supervisor and author of several safety articles in naval publications. His main interests are CoCo speech and music synthesis.

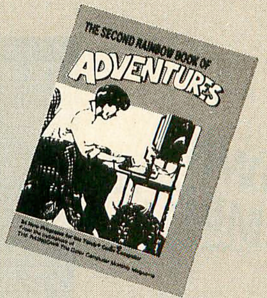
Recommended Reading for Your CoCo from . . .

The Rainbow Bookshelf


THE COMPLETE RAINBOW GUIDE TO
OS-9
By Dale L. Puckett and Peter Dibble


THE RAINBOW BOOK OF
SIMULATIONS
20 NEW PROGRAMS JUST FOR THE TRS-80 COLOR AND TDP-100 COMPUTERS





The Complete Rainbow Guide To OS-9

The book that demystifies the state-of-the-art operating system for the Tandy Color Computer. Authors Dale L. Puckett and Peter Dibble show you how to take advantage of OS-9's multi-tasking and multi-user features, and the capability of redirecting input and output commands at will. An easy-to-read, step-by-step guide packed with hints and tips, tutorials and free software in the form of program listings.
Book $19.95, Disk $31.00 (2 disks, book not included)

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A collector's item containing 14 winning programs from THE RAINBOW's very first Adventure contest. Includes such favorites as *Sir Randolf of the Moors, Search for the Ruby Chalice, Deed of the York, Horror House, One Room, The Door* and *Dr. Avaloe.* Plus, hints and tips on solving Adventures.
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The Second Rainbow Book of Adventures

Our newest arrival features 24 of the most challenging Adventure games ever compiled. Meet the Beatles and battle the Blue Meanies, find a hidden fortune, or win the heart of a beautiful and mysterious princess. Experience the thrills and chills of the most rugged Adventurer without ever leaving your seat. *Ring Quest, Secret Agent Man, Dark Castle, Curse of Karos, Island* and more!
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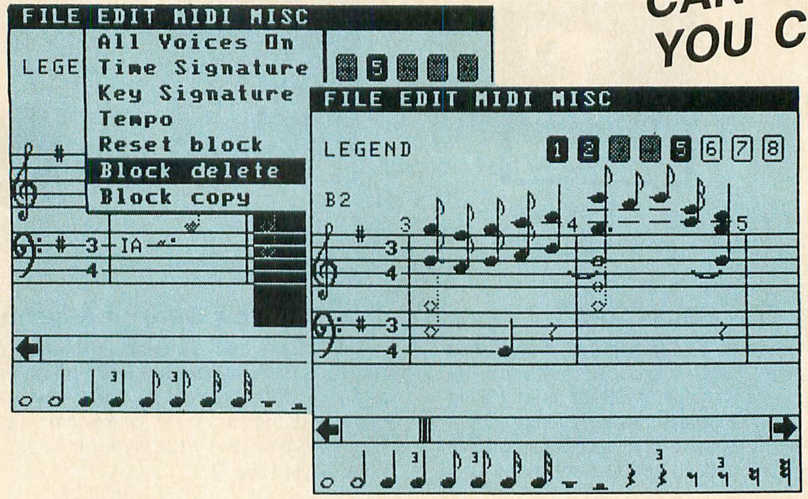
The Musical Coco Max™

IF YOU CAN POINT, YOU CAN COMPOSE

PULL DOWN MENUS

ICONS!

A MUST FOR MIDI USERS



LYRA is the most powerful music composition program we have seen on any computer. We don't mean just the COCO, we really mean any computer. Whether you are a novice trying to learn music or a professional musician with MIDI equipment you will find LYRA a powerful tool. You see, we wrote LYRA for musicians that hate computers. If you want proof, purchase a LYRA demo for $7.95. We will apply the demo price to your purchase. MIDI output requires the LYRA MIDI cable (#MC158) or COCO MIDI Seq/Editor (#CM147).

- Ultra Easy to use, just point with joystick or mouse and click.
- Compose with up to 8 completely independent voices.
- Room for over 18,000 notes. (This is not a misprint!)
- Super Simple Editing Supports:

Note insert	Block insert
Note delete	Block delete
Note change	Block copy

- Output music to:

TV Speaker	Monitor Speaker
STEREO PAK	ORCHESTRA 90
SYMPHONY 12	COCO MIDI S/E
MIDI Synth	MIDI Drum Machine

- Output up to 4 voices without additional hardware.
- Output all 8 voices using either SYMPHONY 12 or one or more MIDI synthesizers and drum machines.
- Output any voice on any of the 16 MIDI channels.
- Transpose music to any key.
- Modify music to any tempo.
- Automatically inserts bar for each measure as you compose.
- Key signature lets you specify sharps and flats only once, LYRA will do the rest.
- Plays MUSICA 2 files using LYRA CONVERT (#LC164).
- Each voice may be visually highlighted or erased.
- Each measure is numbered for easy reading.
- Solo capability
- Block edits are highlighted.
- Tie notes together for musical continuity.
- Name of note pointed to is constantly displayed.
- Jump to any point in the score instantaneously.
- Memory remaining clearly displayed, however you will have plenty of memory even for the most demanding piece.
- Help menu makes manual virtually unnecessary.
- LYRA is 100% software, no need for extra hardware unless you want more power.
- Music easily saved to tape or disk.
- Requires 64K and mouse or joystick.

LYRA (Disk Only) #LY122 . . . . **$54.95**

LYRA OPTIONS

These LYRA options are **not** required. They are provided for those wishing additional flexibility.

LYRA CONVERT

A program to convert MUSICA 2 files to LYRA files.
(T or D) #LC164 . . . . **$14.95**

LYRA STEREO ENHANCER

Gives the LYRA stereo output when used with the STEREO PAK or ORCHESTRA 90.
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LYRA MIDI CABLE

A cable to connect your computer to your MIDI synthesizer.
#MC158 . . . . **$14.95**

LYRA SYMPHONY 12 ENHANCER

Lets LYRA play all 8 voices through SYMPHONY 12.
(T or D) #LS177 . . . . **$19.95**

STEREO PAK

Plugs into the COCO ROM cartridge slot allowing easy connection to your stereo system.
#SP193 . . . . **$39.95**

SYMPHONY 12

A real hardware music synthesizer, lets LYRA play all 8 voices in stereo.
(T or D) #SY149 . . . . **$69.95**

COCO MID Seq/Editor

A professional quality MIDI interface for MIDI synthesizers.
(Disk only) #CM147 . . . . **$149.95**

MUSIC LIBRARY

A collection of over 800 songs. When used with CONVERT, it gives an incredible LYRA library. Each volume 100 songs.
(T or D) #MLXXX **$29.95**

COCO MAX is a trademark of Colorwave.
ORCHESTRA 90 is a trademark of Radio Shack.

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SEQUENCER/EDITOR

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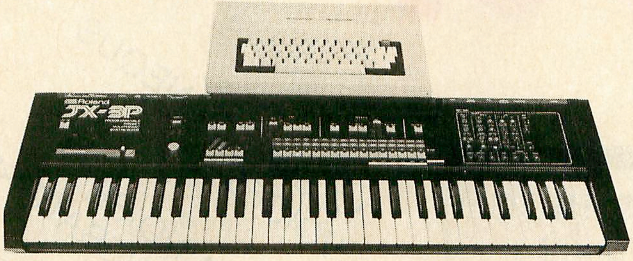

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- May be used as a sequencer.
- User friendly graphics display.
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- Save your masterpiece to disk.
- Playback any or all tracks at any tempo.
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- Simple music editing.
- Requires 64K disk system.
- Transposition.

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MUSICA MIDI™

MUSICA MIDI takes any MUSICA 2 music file and plays it through your MIDI synthesizer. We offer you over 800 tunes from our MUSIC LIBRARY series (sold separately) or create your own music using MUSICA 2. Includes: documentation, plenty of music, and the cable to connect between the COCO and your synthesizer.
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DX-7 LIBRARIAN™

RAM cartridges for the Yamaha DX-7 aren't cheap and don't hold all the sounds you would like. The DX-7 LIBRARIAN is a program that when used with COCO MIDI, lets you save and load any number of sounds. Save sounds individually or as a group letting you load the DX-7 in seconds.
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The MUSIC LIBRARY series consists of 8 volumes: 100 through 800 each sold separately. Each contains over 100 four voice music selections with a playing time of over 3 hours each. The disk version is shipped on 5 full disks. When coupled with STEREO PAK, the music is reproduced with unsurpassed realism.

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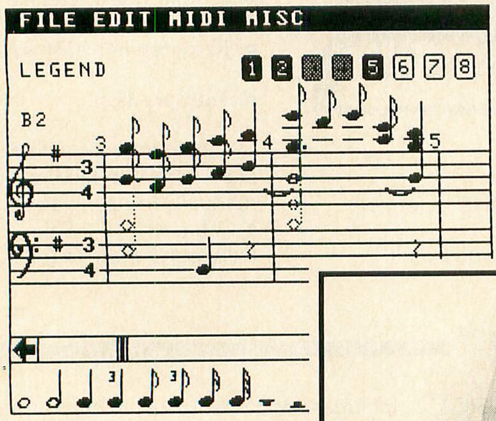

musical applications of microprocessors

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STEREO AND MONO. By connecting SYMPHONY 12 to your home stereo system, music is produced in stereo, 6 voices from each channel. However, you don't need to have a stereo system, all 12 voices also come out of your TV or monitor.

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SYMPHONY 12. You get over a dozen music and sound effect selections and complete documentation. Software is shipped on Tape or Disk.

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This course covers all the basics from music notation & duration, key signatures, tempo, to an introduction of the keyboard. This is an entry level course recommended as a prerequisite for Course 2.

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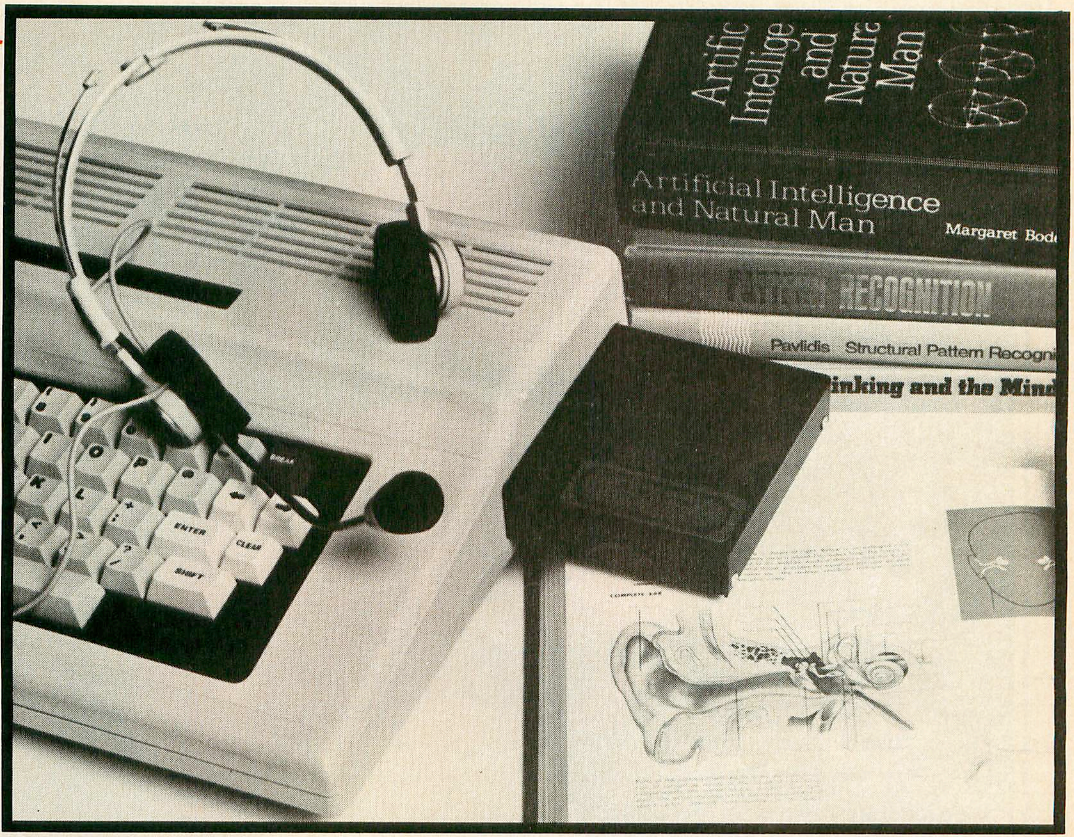
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Artificial Intelligence and Natural Man
Margaret Bod
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Two Years In the Making. Speech Systems was formed to develop new and innovative speech products. After 2 years of intensive Research and Development, we have created a truely sophisticated speech recognition device. Recognition rates from 95% to 98% are typical. Until now, such a product was outside the price range of the personnel computer market, and even small businesses.

EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

Speech and Sound Recognition. EARS is really a sound recognition system, so it really doesn't matter whether you speak in English, Spanish, or French. In fact you do not have to speak at all, you can train EARS to understand sounds such as a musical note or a door slamming.

Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call **(312) 879-6844**, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

VOICE CONTROL

Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF". . **$24.95**

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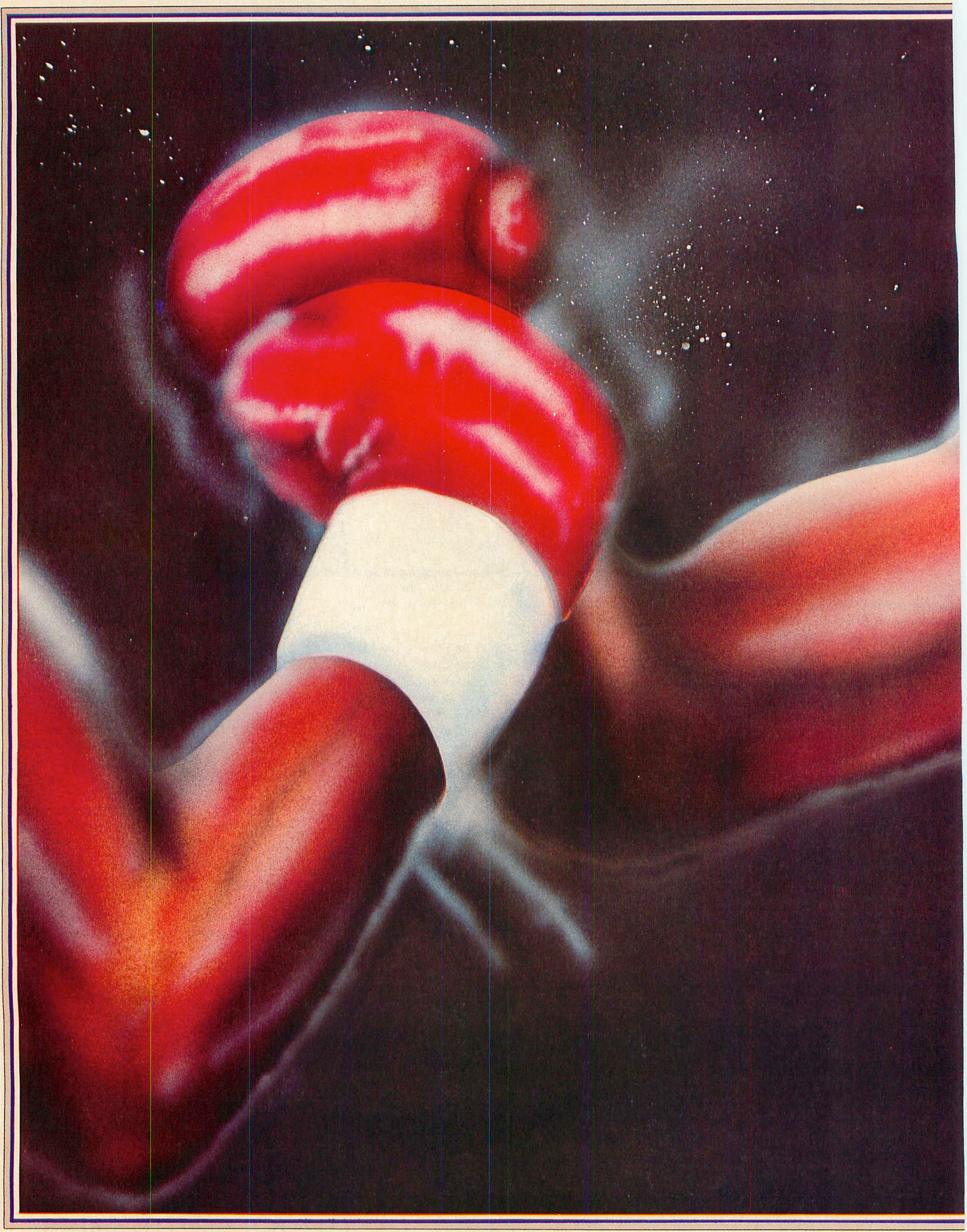
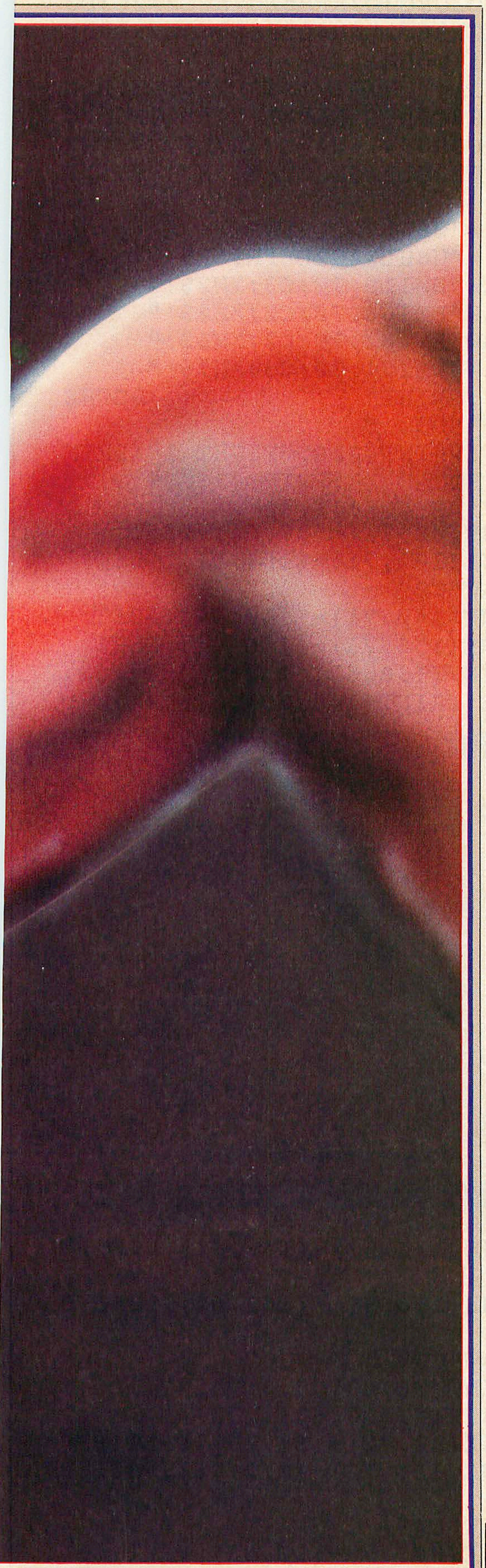


32K
ECB



It takes a skilled boxer to come out the winner when you're in . . .

The Eye of the Tiger

By Tim Jones

After seeing the new *Rocky* movie, I just had to try and make a boxing game for my CoCo. Finally, after several long weeks I came up with *Boxing*.

The object of the game is to gain as many points as possible, beat all three opponents and never get knocked down.

When you run the game, the title screen appears and a short song is played. The scoreboard is then presented. This shows your physical strength as opposed to your opponent's. Also on this screen are the fight and round numbers and the total score, which is updated after every fight.

The game screen is composed of several parts. At the top your opponent's strength is represented by a blue bar; your strength is shown at the bottom. You are the man marked "U.S.A." At the left of the screen is a red time bar. When this bar reaches the bottom, the round ends.

Move the joystick in the direction you want to go (without pressing the button). To punch with the left hand, press the firebutton. To punch with the right hand is a little harder. First move the joystick to the right, and then press the firebutton. Since throwing a right punch is harder, you receive more points for hitting with it.

Every time you hit with the left hand, your opponent's power decreases by 10, your power increases by five, and your score increases by five points. If you hit with the right hand, his power decreases by 15, yours increases by five, and your score increases by 10. The same also goes for him.

Decreasing the opponent's strength to zero knocks him down. In order to advance a fight, either knock him out completely, or last three rounds with a score higher than his.

To knock out the first opponent completely, decrease his power to zero. To knock out the second opponent com-

Tim Jones is a high school student in Clinton, Louisiana. He enjoys working with computers and swimming.

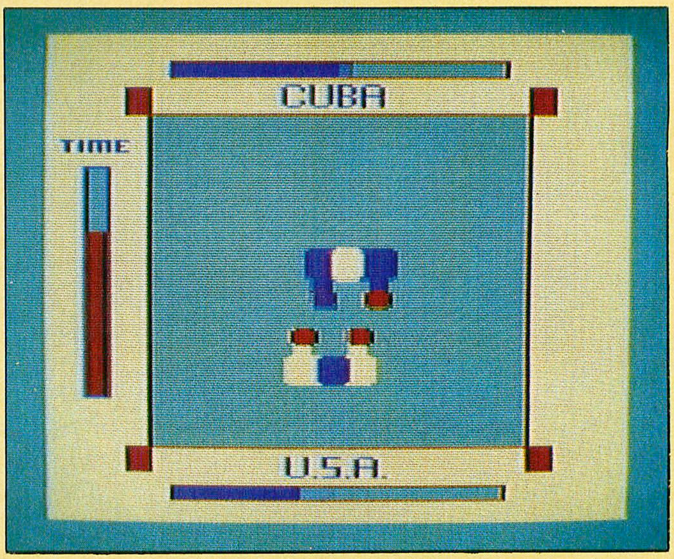
pletely, you must knock him down twice in one round. To knock out the third opponent you must have three knock downs in one round. Note: There is no count after a knock down, so stay alert!

Game play is rather sluggish, so I have included a `POKE 65495,0` in Line 130. If your computer can't use it, just delete that line. As you can see, the game is long; buying RAINBOW ON TAPE can save hours of debugging. Enjoy! ☐

160	207	1310	3
280	131	1450	71
500	118	1560	232
690	179	1690	50
850	150	1810	114
970	228	1910	142
1170	143	2080	10
		END	73

The listing: BOXING

```
1 ' TIM JONES
2 ' P.O. BOX 7938
3 ' CLINTON, LA. 70722
4 ' COMPLETED JAN. 20, 1986
10 PCLEAR4:CLEAR500:RESTORE
20 RO=1:FI=1:L(1)=90:L(2)=60:L(3
)=50:KO=0
30 PMODE3,1:PCLS:SCREEN0,0
40 CLS(0):FORY=1 TO 5:FORX=1 TO
32:READ A
50 A$(Y)=A$(Y)+CHR$(A+48):NEXT X
,Y
60 PRINT@33,A$(1);A$(2);A$(3);A$
(4);A$(5);
70 PRINT@239,"BY";:PRINT@300,"TI
M JONES";
80 DIM M(70),M2(70),GL(40),P2(90
),P1(80),PA(80),PB(90),R1(80),R2
(90),RA(80),RB(90),FL(200)
90 POKE65494,0
100 A$="T3O4L8EL4GL1AL8AL4BL1E"
110 PLAY"XA$;L8EE;XA$;"
120 PLAY"T3L8DCL4DL8CDL2EL8DDL4C
L8CO3L4BL8BL1AL4AO4AL1D"
130 POKE65495,0
139 ' GRAPHICS FOR GAME
140 DRAW"C4":LINE(45,30)-(210,16
0),PSET,B
150 LINE(45,30)-(35,20),PSET,BF
160 LINE(210,160)-(220,170),PSET
,BF
170 LINE(210,30)-(220,20),PSET,B
F
180 LINE(45,160)-(35,170),PSET,B
F
190 L$(1)="BM96,23C3R6U4L6D8R2C2
R8C3R6L6U8R6D8R2C2R2C3U8D8R8C2R2
C3U6E2R4F2D6U4L6R8C2D4R2C3U8F8U8
R2C2R2C3D8R5EU5H2L2":'POLAND
200 L$(2)="BM113,21C3H2L4G2D5FR5
EU2C2R4D3U8C3D7RFR5EU7R2C2R2C3D8
R5EU2HL2R2EU3L4R4C2R4D8C3U7RER5F
D7U4L6":'CUBA
210 L$(3)="BM101,19C3D7FR5EU7R2C
2R2D8C3R2C2R2C3R6U4L6U4R8C2D8R2C
3R2C2R2C3R6U4L6U4R8C2R2D8C3R2C2R
2C3U8R5FD3GL2F3R2C2R2C3R":'U.S.S
.R.
220 M1$="U8HL8G2D8FR9E"
230 M2$="U8HL34G2D8FR35E"
240 DRAW"BM116,70;C3;XM2$;"
250 DRAW"BM166,70;C2;XM2$;"
260 DRAW"BM102,70;C2;XM1$;"
270 DRAW"BM154,70;C3;XM1$;"
280 CLS:PRINT"                   SCORE
":PRINT"YOU: 0
HIM: 0":PRINT@236,"FIGHT 1":PRIN
T@268,"ROUND 1":PRINT@362,"TOTAL
 SCORE":PRINT@431,"0"
290 LINE(88,71)-(88,61),PSET
300 LINE(104,71)-(104,61),PSET
310 DRAW"C2"
320 LINE(140,71)-(140,61),PSET
330 LINE(156,71)-(156,61),PSET
340 PAINT(138,63),2,2:PAINT(158,
63),2,2:PAINT(144,63),3,3
```



```
350 LINE(132,57)-(138,60),PSET,B
F
360 LINE(156,57)-(162,60),PSET,B
F
370 DRAW"C3"
380 PAINT(84,63),3,3:PAINT(110,6
3),3,3:PAINT(93,63),2,2
390 LINE(82,72)-(88,76),PSET,BF
400 LINE(106,72)-(112,76),PSET,B
F
410 DRAW"C4"
420 LINE(80,77)-(90,83),PSET,BF
```

```
430 LINE(104,77)-(114,83),PSET,B
F
440 PSET(104,83,1):PSET(114,83,1
):PSET(114,77,1):PSET(104,77,1)
450 PSET(80,83,1):PSET(90,83,1):
PSET(90,77,1):PSET(80,77,1)
460 GET(72,56)-(124,88),M,G
470 GET(80,77)-(116,83),GL,G
480 PUT(130,50)-(166,56),GL,PSET
490 GET(122,46)-(174,76),M2,G
500 LINE(122,46)-(150,60),PRESET
,BF
510 PUT(138,32)-(174,38),GL,PSET
520 LINE(158,32)-(172,38),PRESET
,BF
530 DRAW"C2":LINE(138,39)-(132,6
0),PSET
540 LINE(144,39)-(138,60),PSET:L
INE(138,39)-(144,39),PSET:PAINT(
140,40),2,2
550 GET(128,31)-(168,72),P2,G
560 PUT(136,40)-(172,46),GL,PSET
570 LINE(150,40)-(170,49),PRESET
,BF:GET(128,40)-(168,72),P1,G
580 LINE(130,32)-(150,60),PRESET
,BF
590 PUT(122,46)-(174,76),M2,PSET
600 PUT(150,32)-(186,38),GL,PSET
610 LINE(154,50)-(164,56),PRESET
,BF
620 DRAW"C2":LINE(152,39)-(156,6
0),PSET
630 LINE(162,60)-(158,39),PSET:L
INE-(152,39),PSET
640 PAINT(154,41),2,2
650 GET(128,32)-(168,72),PB,G
660 PUT(152,40)-(188,46),GL,PSET
670 GET(128,40)-(166,72),PA,G
680 LINE(72,56)-(124,88),PRESET,
BF:PUT(74,28)-(126,60),M,PSET
690 LINE(106,49)-(116,55),PRESET
,BF:PUT(100,67)-(136,99),GL,PSET
700 DRAW"C3":LINE(108,45)-(102,6
6),PSET:LINE(116,45)-(110,66),PS
ET:LINE(104,66)-(108,66),PSET:PA
INT(110,50),3,3
710 GET(78,33)-(118,73),R2,G
720 PUT(102,58)-(138,64),GL,PSET
730 GET(78,33)-(118,64),R1,G
740 LINE(82,56)-(120,78),PRESET,
BF:PUT(74,28)-(126,60),M,PSET
750 LINE(80,45)-(94,58),PRESET,B
F:LINE(45,30)-(180,30),PSET
760 PUT(64,67)-(100,73),GL,PSET
770 DRAW"C3":LINE(82,45)-(88,66)
,PSET:LINE(90,45)-(96,66),PSET:L
INE-(90,66),PSET:PAINT(92,64),3,
3
780 GET(80,33)-(118,73),RB,G
```

```
790 PUT(62,58)-(98,64),GL,PSET
800 GET(80,33)-(118,64),RA,G
810 DRAW"C4":LINE(16,50)-(26,140
),PSET,BF
820 LINE(48,18)-(206,28),PRESET,
BF
830 DRAW"C3":LINE(56,10)-(127,16
),PSET,BF:DRAW"C4":LINE(54,10)-(
200,16),PSET,B:LINE(128,11)-(198
,15),PRESET,BF
840 DRAW"C3":LINE(56,176)-(127,1
82),PSET,BF:DRAW"C4":LINE(54,176
)-(200,182),PSET,B:LINE(128,177)
-(198,181),PRESET,BF
850 X=100:Y=102:X2=100:Y2=60:TI=
51:H=127:H2=127
860 LINE(48,32)-(206,156),PRESET
,BF
870 DRAW"C4":LINE(45,30)-(210,16
0),PSET,B
880 PAINT(0,0),2,4
890 DRAW"C3":LINE(16,50)-(26,140
),PSET,B
900 PAINT(50,19),2,2:DRAW L$(FI)
910 DRAW"BM106,164C3D7RFR5EU7R2C
2R2D8C3R2C2R2C3R6U4L6U4R8C2D8R2C
3R2C2R2C3U6E2R4F2D6R2C2R2C3L2C2L
2C3U4L6":'U.S.A.
920 DRAW"BM6,40C3R4L2D4R2C2R4C3U
4R2C2R2C3D4U4R4D4U4R4D4R2C2R2C3R
4L4U2R2L2U2R4":'TIME
929 ' START OF MAIN ROUTINE
930 SCREEN1,0:PLAY"T4L2O4CC"
940 MX=JOYSTK(0):MY=JOYSTK(1):TI
=TI+.5:LINE(18,TI)-(24,TI),PRESE
T:IF TI=139 THEN PLAY"V15T4L3O4C
CCC":GOTO1670
950 IF Y=<Y2+30 THEN Y=Y+2
960 IF X=<46 THEN X=46 ELSE IF X
=>156 THEN X=156
970 IF Y=<32 THEN Y=32 ELSE IF Y
=>128 THEN Y=128
980 PUT(X,Y)-(X+52,Y+30),M2,PSET
990 PUT(X2,Y2)-(X2+52,Y2+32),M,P
SET
1000 IF RND(100)=<L(FI) THEN 102
0
1010 IF RND(2)=1 THEN 1400 ELSE
1560
1020 IF Y2+30=>Y THEN Y2=Y2-2
1030 IF RND(10)=>5 THEN X2=X2-4
ELSE X2=X2+4
1040 IF RND(10)=>5 THEN Y2=Y2+2
ELSE Y2=Y2-2
1050 IF X2=<46 THEN X2=46 ELSE I
F X2=>156 THEN X=156
1060 IF Y2=<32 THEN Y2=32 ELSE I
F Y=>128 THEN Y=128
1070 IF PEEK(65280)=126 OR PEEK(
65280)=254 THEN 1130
1080 IF MX=<10 THEN X=X-4
1090 IF MX=>50 THEN X=X+4
1100 IF MY=<10 THEN Y=Y-2
1110 IF MY=>50 THEN Y=Y+2
1120 GOTO940
1130 IF MX=>50 THEN ELSE 1250
1140 LINE(X+32,Y+3)-(X+42,Y+11),
PRESET,BF
1150 PUT(X+6,Y-7)-(X+44,Y+39),PA
,OR
1160 IF PPOINT(X+30,Y-10)=4 THEN
 HG=1
1170 IF PPOINT(X+36,Y-10)=4 THEN
 HG=1
1180 IF PPOINT(X+34,Y-13)=4 THEN
 HG=1
1190 LINE(X+30,Y-8)-(X+40,Y+1),P
RESET,BF
1200 IF HG=1 THEN HG=0:PLAY"T4L2
55V31O1ADCFBAGEDV16ACGADV4EABCAE
DB":GOTO940
1210 PUT(X+6,Y-15)-(X+46,Y+25),P
B,OR
1220 LINE(X+28,Y-15)-(X+38,Y+1),
PRESET,BF
1230 IF PPOINT(X+32,Y-16)=2 THEN
 H=H-15:H2=H2+5:S2=S2+10:GOSUB13
60
1240 GOTO 940
1250 LINE(X+8,Y+3)-(X+18,Y+11),P
RESET,BF
1260 PUT(X+6,Y-7)-(X+46,Y+39),P1
,OR
1270 IF PPOINT(X+18,Y-10)=4 THEN
 HG=1
1280 IF PPOINT(X+16,Y-12)=4 THEN
 HG=1
1290 IF PPOINT(X+24,Y-12)=4 THEN
 HG=1
1300 LINE(X+14,Y-8)-(X+24,Y+1),P
RESET,BF
1310 IF HG=1 THEN HG=0:PLAY"T255
L255V31O1ADCFBAGEDV16ACGADV4EABC
AEDB":GOTO940
1320 PUT(X+6,Y-16)-(X+46,Y+25),P
2,OR
1330 LINE(X+14,Y-15)-(X+26,Y+2),
PRESET,BF
1340 IF PPOINT(X+20,Y-16)=2 THEN
 H=H-10:H2=H2+5:S2=S2+5:GOSUB 13
60
1350 GOTO 940
1360 IF H=<57 THEN LINE(57,11)-(
199,15),PRESET,BF:PLAY"V15T4L4O4
ADEFA":GOTO 1390
1370 PLAY"T4L255V30O1;1;2;3;4;5;
6"
1380 LINE(H,11)-(199,15),PRESET,
BF:DRAW"C3":LINE(H2,177)-(55,181
),PSET,BF:RETURN
1390 S2=S2+10:H=127:H2=127:KO=KO
+1:GOTO1680
1400 LINE(X2+32,Y2+21)-(X2+42,Y2
+27),PRESET,BF
1410 PUT(X2+4,Y2+6)-(X2+44,Y2+37
),R1,OR
1420 IF PPOINT(X2+30,Y2+38)=4 TH
EN HG=1
1430 IF PPOINT(X2+34,Y2+38)=4 TH
EN HG=1
1440 IF PPOINT(X2+34,Y2+41)=4 TH
EN HG=1
1450 LINE(X2+28,Y2+31)-(X2+38,Y2
+37),PRESET,BF
1460 IF HG=1 THEN HG=0:PLAY"T4L2
55 V31O1ADCFBAGEDV16ACGADV4EABCA
EDB":GOTO 940
1470 PUT(X2+4,Y2+6)-(X2+44,Y2+46
),R2,OR
1480 LINE(X2+26,Y2+29)-(X2+38,Y2
+46),PRESET,BF
1490 IF PPOINT(X2+34,Y2+47)=3 TH
EN H2=H2-10:H=H+5:S1=S1+5:GOTO 1
510
1500 GOTO940
1510 IF H2=<57 THEN LINE(57,177)
-(199,181),PRESET,BF:PLAY"V15T4L
4O4ADEFA":GOTO 1540
1520 PLAY"T4L255V30O1;1;2;3;4;5;
6"
1530 LINE(H2,177)-(199,181),PRES
ET,BF:DRAW"C3":LINE(H,11)-(55,15
),PSET,BF:GOTO 940
1540 POKE65494,0:PLAY"T3O3P4L2CL
3CL8CL2CE-L8DL3DL8CL3CO2L8BO3L2C
P2":CLS:PRINT:PRINT"  YOU LOST T
HIS TIME AROUND,      BUT YOU CA
N ALWAYS CHALLANGE    HIM TO A R
E-MATCH.":GOTO 2160
1550 GOTO 940
1560 LINE(X2+8,Y2+16)-(X2+18,Y2+
27),PRESET,BF
1570 PUT(X2+6,Y2+6)-(X2+44,Y2+37
),RA,OR
1580 IF PPOINT(X2+16,Y2+39)=4 TH
EN HG=1
1590 IF PPOINT(X2+20,Y2+39)=4 TH
EN HG=1
1600 IF PPOINT(X2+18,Y2+40)=4 TH
EN HG=1
1610 LINE(X2+12,Y2+29)-(X2+22,Y2
+38),PRESET,BF
1620 IF HG=1 THEN HG=0:PLAY"T4L2
55V31O1ADCFBAGEDV16ACGADV4EABCAE
DB":GOTO940
1630 PUT(X2+6,Y2+6)-(X2+44,Y2+46
),RB,OR
```

```
1640 LINE(X2+12,Y2+29)-(X2+24,Y2
+46),PRESET,BF
1650 IF PPOINT(X2+20,Y2+47)=3 TH
EN H2=H2-15:H=H+5:S1=S1+10:GOTO
1510
1660 GOTO940
1670 RO=RO+1:KO=0:IF RO=4 THEN 1
720 ELSE CLS:PRINT"
SCORE":PRINT"YOU:";S2;"
        HIM:";S1:PRINT@236,"FIGH
T ";FI:PRINT@268,"ROUND ";RO:PRI
NT@362,"TOTAL SCORE":PRINT@430,S
C:FOR T=1TO2000:NEXTT:GOTO810
1680 IF KO=1 AND FI=1 THEN FI=2:
RO=0:SC=SC+S2:S1=0:S2=0:GOSUB176
0:GOTO1670
1690 IF KO=2 AND FI=2 THEN FI=3:
RO=0:SC=SC+S2:S1=0:S2=0:GOSUB176
0:GOTO 1670
1700 IF KO=3 AND FI=3 THEN SC=SC
+S2:GOSUB 1760:GOTO 1740
1710 LINE(55,177)-(127,181),PSET
,BF:LINE(55,11)-(127,15),PSET,BF
:LINE(128,177)-(199,181),PRESET,
BF:LINE(128,11)-(199,15),PRESET,
BF:GOTO940
1720 IF S1 >= S2 THEN CLS:PRINT:
PRINT"  HE WON BY A SPLIT DECIS
ION":GOTO 1540
1730 IF S1<S2 THEN CLS:PRINT:PRI
NT"  YOU WON BY A SPLIT DECISION
":IF FI=3 THEN 1750 ELSE FORT=1T
O1000:NEXTT:KO=0:FI=FI+1:RO=0:SC
=SC+S2:S1=0:S2=0:GOTO 1670
1740 CLS:PRINT:PRINT"YOU KNOCKED
 OUT THE CHAMPION!!!!"
1750 SC=SC+S2:FORT=1TO1000:NEXTT
:GOTO1870
1760 FORT=1TO20:CLS(2):PRINT@268
,"knockout";
1770 PLAY"T255CDEFGAB"
1780 CLS(2)
1790 PLAY"T255AC"
1800 NEXT
1810 RETURN
1820 DATA 142,140,140,137,128,13
4,140,140,137,128,137,128,128,12
9,136,132,140,141,140,140,128,13
9,128,128,128,138,129,140,140,14
0,137
1830 DATA 128,138,128,128,133,12
8,138,128,128,133,128,128,137,12
9,136,128,128,128,133,128,128,12
8,138,137,128,128,138,133,128,12
8,128,128,128
1840 DATA 142,140,140,137,128,13
8,128,128,133,128,128,129,137,12
8,128,128,128,133,128,128,128,13
8,128,137,128,138,133,128,128,12
9,131,128
1850 DATA 138,128,128,133,128,13
8,128,128,133,128,129,136,128,13
7,128,128,128,133,128,128,128,13
8,128,128,137,138,133,128,128,12
8,133,128
1860 DATA 140,140,140,136,128,13
2,140,140,136,128,136,128,128,12
8,136,132,140,140,140,140,128,13
6,128,128,128,136,128,140,140,14
0,136,128
1870 PMODE3,1:PCLS:SCREEN0,0
1880 POKE65494,0
1890 FOR X=100TO162 STEP12
1900 DRAW"BM"+STR$(X)+",96C2D90R
2U90R2D90R2C4U90R2D90R2U90"
1910 NEXTX
1920 DRAW"BM172,96;C2D90R2U90"
1930 DRAW"C3":LINE(142,96)-(174,
133),PSET,BF
1940 FOR Y=100 TO 130 STEP 6:FOR
X=146 TO 170 STEP 6
1950 PSET(X,Y,2):PSET(X+2,Y+3,2)
:NEXTX,Y
1960 LINE(142,96)-(172,133),PSET
,B
1970 GET (100,96)-(176,191),FL,G
1980 PMODE3,1:PCLS:SCREEN1,0
1990 Y=Y-2
2000 PUT(90,Y)-(166,Y+95),FL,PSE
T
2010 READ N
2020 IF N=-1 THEN 2080
2030 SOUND N+100,1
2040 IF Y=18THEN Y=Y+2
2050 GOTO 1990
2060 DATA 47,47,25,25,47,47,8,8,
25,33,47,59,70,47,47,47,47,47,25
,25,47,47,8,8,85,80,85,93,59,85,
85,85,47,93,93,85,76,76,70,70,76
2070 DATA 85,70,59,47,76,76,76,7
6,76,59,59,76,76,47,47,47,59,76,
47,85,76,-1
2080 FORT=1TO8
2090 X=RND(200)+25:Y=RND(140)+20
2100 FORR=1TO30 STEP5
2110 C=RND(3)+1
2120 CIRCLE(X,Y),R,C
2130 NEXTR,T
2140 FORT=1TO2000:NEXTT
2150 CLS:PRINT:PRINT"  THE PRESI
DENT OF THE UNITED     STATES CO
NGRATULATES YOU FOR    WINNING T
HE TITLE OF...":PRINT:PRINT"
WORLD HEAVY-WEIGHT BOXING":PRINT
@236,"CHAMPION"
2160 PRINT:PRINT"    YOUR FINAL
SCORE WAS";SC:PRINT:PRINT TAB(12
)"GAME OVER":END
```

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THE NEW
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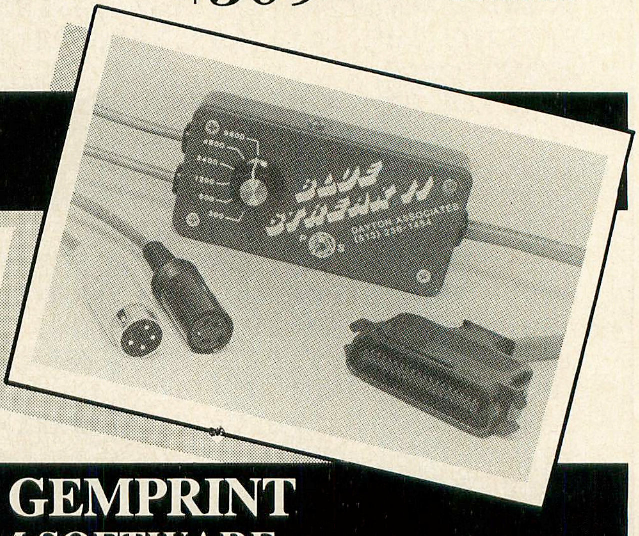

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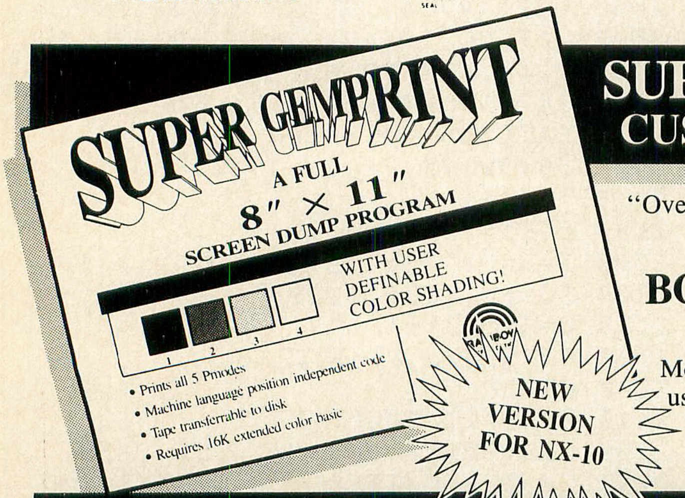

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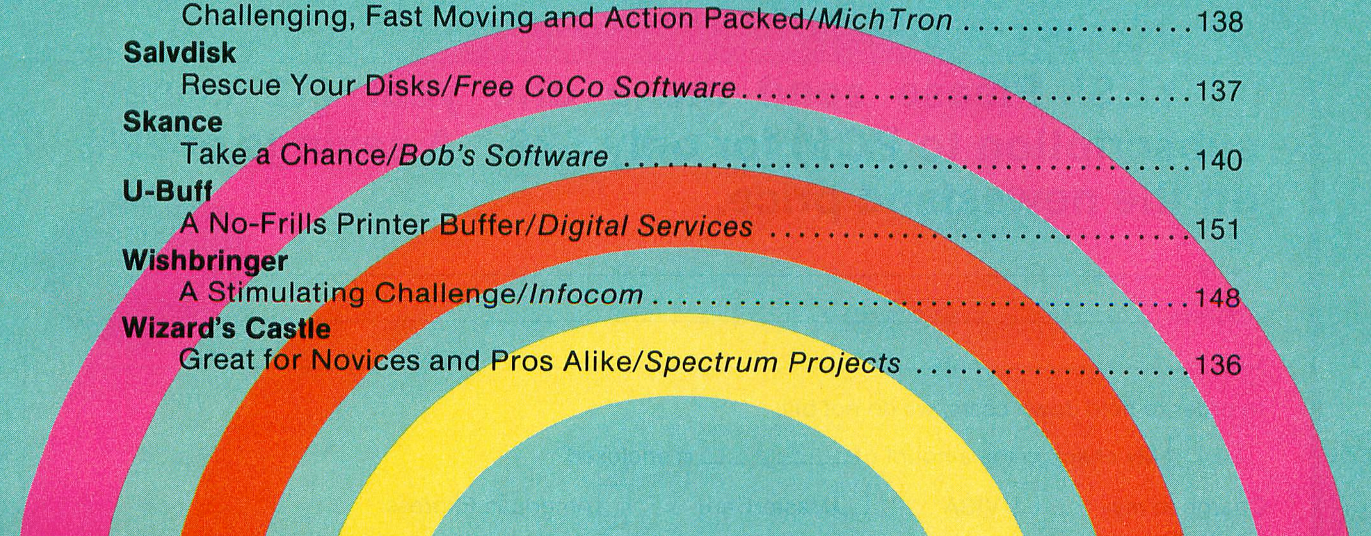

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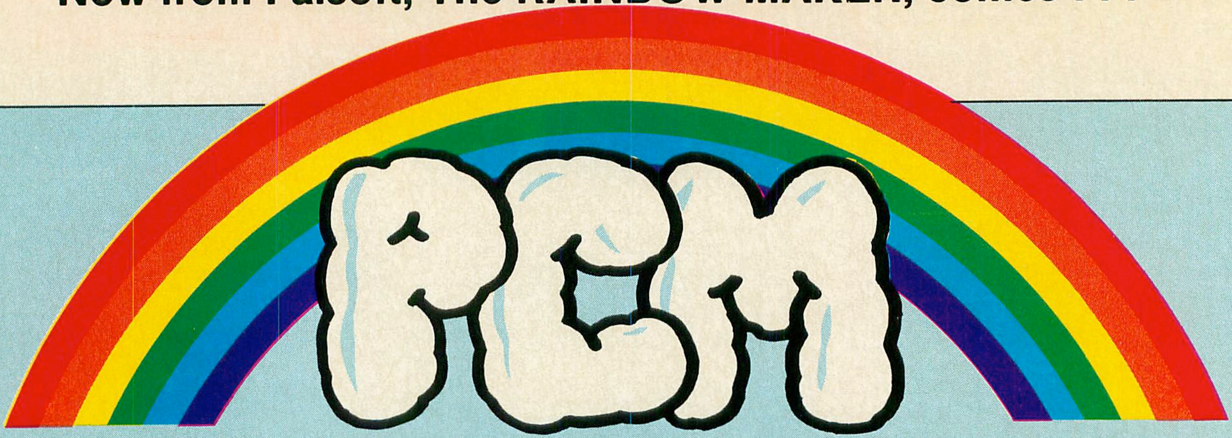

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RECEIVED & CERTIFIED

THE FOLLOWING PRODUCTS have recently been received by THE RAINBOW, examined by our magazine staff and approved for the *Rainbow Seal of Certification*, your assurance that we have seen the product and have ascertained that it is what it purports to be.

This month the *Seal of Certification* has been issued to:

Max Fonts, a collection of 72 fonts for use with the *CoCo Max* graphics program. Fonts can be typed onto the screen utilizing all of *CoCo Max*'s text style combinations such as bold, italics, outline, etc. Font names automatically appear in *CoCo Max*'s pull-down menu. ***Derringer Software Inc., P.O. Box 5300, Florence, SC 29502, disk of 24 fonts, $24.95; set of 3 disks, $64.95.***

Ultra Telepatch, a 64K program requiring one disk drive and *Telewriter-64*. This new version of *Telepatch* includes word delete, integrated type-ahead keyboard scan with buffer, in memory disk I/O menu with no loss of buffer memory and more. ***CMD Micro Computer Services Ltd., 10447-124 Street, Edmonton, Alberta, Canada T5N 1R7, $19.95 plus $2 S/H.***

The Last Word, a word processor that requires 64K and OS-9. Features pull-down menus, on-screen formatting and 22,000 word online dictionary. Edit files larger than memory, and define macros, pagination, headers and footers. ***Computerware, Box 668, Encinitas, CA 92024, disk $49.95 plus $2 S/H.***

L1 Utility Pak, an OS-9 productivity enhancement. Package contains Filter Kit #1, Filter Kit #2, Hacker's Kit #1 plus several new programs. ***D.P. Johnson, 7655 SW Cedarcrest Street, Portland, OR 97223, $49.95.***

Karate, a 64K game using karate kicks and punches to score points. Requires one or two joysticks depending on number of players. ***Diecom Products, 6715 Fifth Line, Milton, Ontario, Canada L9T 2X8, tape or disk, $28.95 U.S.; $38.95 Canada.***

Memory Bank, a 64K computer program that allows full use of the second 32K in 64K color computers. A RAM disk is also included that allows the second bank to be used for storing programs. Computer can be configured for the "all-RAM" mode, allowing modification of the BASIC, Extended or Disk ROMs, and placing a BASIC program in the upper 8K of memory. ***Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640, tape, $27.95; disk $29.95, plus $3 S/H.***

Physcho: 1, 64K games requiring one disk drive. Package of eight psychological exercises tests skills in observation, reaction time and memory. ***Lomiq, c.p. 105 Succursale A, Jonquire, Quebec, Canada G7X 7V8, $34 U.S., $45 Canada.***

DS-69/69A Digisector, an enhanced version of 64K video digitizer that accepts NTSC standard video input from a source such as closed-circuit television camera or videotape recorder and converts the analog video signal to digital data. ***Micro Works, P.O. Box 1110, Del Mar, CA 92014, $149.95.***

RESETCHG, a machine language program that changes the reset vector in 64K mode so when the Reset button is pressed, the CoCo stays in 64K mode. ***Neat-O-Software, Route 3, Box 205, Kingsport, TN 37664, tape $10 plus $2 S/H.***

Dragon Blade, a graphics Adventure game requiring 64K ECB and one disk drive. The scenario places you in a time of swords and sorcery, when only the bravest of men could destroy the foulest of beasts. Your quest for the legendary blade leads you to the Forest of Lore and it is from here that your Adventure begins. ***Prickly-Pear Software, 2640 N. Conestoga Avenue, Tucson, AZ 85749, $29.95.***

Wizard's Castle, a 64K graphics Adventure game requiring one disk drive. The objective is to save the princess by collecting 24 objects and returning them to the king. Your enemy is the wizard, who has the power to bring back to life the creatures you slay in the quest to save the princess. **Spectrum Projects, P.O. Box 21272, Woodhaven, NY 11421, $24.95 plus $3 S/H.**

CoCo Keyboard, a new Color Computer 2 keyboard to fit your old-style Color Computer (silver or white case), TDP-100 and older CoCo 2. Drops in with no soldering or cutting necessary. ***Spectrum Projects, P.O. Box 21272, Woodhaven, NY 11421, $14.95. Adaptor for 1982 and previous computer (D&E Boards), $9.95. Add $3 S/H.***

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW's reviewers for evaluation.

— Judi Hutchinson

REVIEWING REVIEWS

Color LISP

Editor:

I must take exception with Mr. Dooman's software review of *Color LISP* in the May 1986 RAINBOW. Mr. Dooman compares LISP to both FORTH and BASIC. These are numerical languages. BASIC is a good general purpose, data-processing programming language. FORTH is an extendable, fast interactive, compiled, stack-oriented control language. LISP is a symbolic manipulation language, extendable by user definitions.

Mr. Dooman complains about the documentation using brackets instead of parentheses. The documentation does not contain brackets in the examples — parentheses are used in all examples and all examples have been tested to ensure they function as described. Not one of our many customers have complained about "brackets."

As Mr. Dooman pointed out, there are no standards in LISP function syntax. In our implementation, the syntax of MAPCAR is: MAPCAR/list/function. In some other LISPs the syntax is: MAPCAR/function/list. The syntax can easily be changed to reverse the arguments simply by defining a new function such as: (DE MAPC (fns lis) (MAPCAR lis fns)). All examples in the documentation have been fully tested. The snytax is clearly stated with ample examples to illustrate the proper use. Also the complete function definitions are provided.

Mr. Dooman mentions none of the features of this implementation for the Color Computer such as: low resolution graphics, integrated into architecture of the Color Computer, joystick, sound, cassette functions, disk functions, printing, PEEK, POKE, USR, firebutton, break, load and save LISP objects, load and save LISP work spaces, and long error messages. This implementation was especially designed to take advantage of the limited resources of the Color Computer. The stack and node area can be redefined to explore different areas of interest. EXPRs, FEXPRs, and machine language subroutines are supported.

Though LISP is an interactive language, this implementation has been optimized for both speed and size. We feel we have a good and reliable product which enables CoCo owners to experiment with a language used extensively in artificial intelligence. Our goal was to provide a powerful, flexible, extendable and reasonably priced software product.

Jim Bachman
Frost Byte

Super RAMdisk

Editor:

Thank you for reviewing the DISTO Super RAMdisk and giving it a fair shake [June 1986]. I would like to inform you that a "hardware" user's manual is now available. The OS-9 software and documentation has been upgraded to V2.0. Anyone who has a print spooler, or any other utility for my RAMdisk may contact CRC Inc., 10802 Lajeunesse, Montreal, Quebec, Canada for more details.

Tony DiStefano
DISTO

DeskMate

Editor:

In Mr. White's review of *DeskMate* for the CoCo in the May 1986 RAINBOW, he mentioned that the Calendar utility was not useful beyond 1999. If he were to enter his data as 4/25/2000 instead of 4/25/00 (which defaults to 1900), he would find the correct date in the correct year. You can use years as late as 9999.

Norman Koslow
Richmond, VA

TX Word Processor

Editor:

I am comparably new to the computer. I got started with the CoCo in August 1985 and ordered RAINBOW at that time.

Since I had purchased the CoCo primarily for word processing, the *TX Word Processor* in "Received and Certified" (November 1985, Page 188) caught my attention. I ordered it and, while waiting, I went to work on *Color Scripsit* as it came with the computer. After *TX* came, I made a quick change and found it so much better in every way. After your review that found *TX* juvenile [March 1986, Page 209], I tried still another word processor, but it too was difficult to run and had very poor documentation, so I went back to *TX* Version 01.08P. I feel your reviewer was over-educated for the job and I think the readers are getting shortchanged because of the review.

This is being written using *TX*, and it is still my favorite. I would like to see another review, preferably by an operator instead of a programmer. There are a lot of us out here who are beginners.

A.J. (Andy) Cryder
St. James City, FL

The Best Epson Screen Dump Utility

Editor:

My program, *The Best Epson Screen Dump Utility*, was reviewed by R.W. Odlin in a recent issue [February 1986, Page 216]. My thanks to your reviewer for taking the time to carefully test the program.

However, one comment in the review has left me scratching my head — that is the matter of pixels being swapped from left to right with *Graphicom* screens. The reviewer did not contact me regarding this problem, and I don't understand how it could happen. The sample printouts on the package are of *Graphicom* screens, and they certainly do not exhibit this problem.

I have no idea how Mr. Odlin loaded the *Graphicom* screens into memory, but if the GC>BIN utility (included with *Graphicom*) is used, I can assure your readers they will have no problem printing out pictures with *The Best Epson Screen Dump Utility.*

Bob van der Poel
CMD Micro Computer Services Ltd.

We welcome letters to "Reviewing Reviews" and remind you that they may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

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RAINBOW ON TAPE is not a stand-alone product, but is intended as an adjunct and complement to the magazine. Even if you purchase RAINBOW ON TAPE, you will still need the magazine for loading and operating instructions.

To order by phone, (*credit card orders only*) call 800-847-0309, 8 a.m. - 5 p.m. EST. All other inquiries call 502-228-4492.

Programs from Our Past Games Issues:

August 1985 — *Brotan the Blue*, a game based more on luck and risk than on skill; *Quest for the Falcon's Lair*, a game that lets you fight for Earth's freedom; *Random Mosaics*, a graphics program: *Soccer Instructor*, a text and graphics game instruction for soccer novices; *Operation Feedom*, a game to save captive scientists; *Hello*, a disk utility solution for the directory's too-speedy scroll; *Earthrot and Pageturn*, graphics programs which simulate the spinning Earth; *A Caterpillar's Alphabet*, an educational game designed to teach the alphabet to preschoolers; *Oodles of Games for 4K*, six short games to amaze and amuse; *Amphibia*, an alien planet's moon base destination game; *Phone*, a home help program that showcases your phone messages; *Sir Eggbert Jumper*, a one-player game with a "swords and sorcery" theme; *Doghouse*, a short game to challenge visual reflexes of everyone from toddlers to adults; and *Vision*, a health education program that tests your eyesight.

August 1984 — *The Jungle*, a game of survival on safari without joysticks; *The Dragon's Gold*, climbing to the top of his lair is a very dangerous game; *Trapperr*, an error trapping utility; *M*A*S*H Trivia Quiz*, 200 questions to test your memory; *Instrument Flight Simulator*, a serious exercise in flight simulation; *IRA Projection*, a finance program to project IRA earnings: *The Trip*, a mix of Adventure and arcade-type games; *Stock Market*, second part of a tutorial on writing a Simulation; *Air Raid on the Keyboard*, a game to sharpen reflexes; *Olympics*, a graphics program that displays the universally known connecting rings; *Disk Drive Speed Check*, a disk utility; and *Expanding BASIC*, part II on enhancing DOS.

Software Review

Pinball Factory Rings Up Points

I've never been a big fan of computer pinball — until now. I've tried practically every CoCo pinball game on the market, and while most of them have been good, after a few games I would invariably become bored. After all, these games only offer the choice of a few playing fields, and even the most diehard pinball fan is sure to soon tire of playing the same game over and over and over.

Enter *Pinball Factory* from MichTron, a terrific new game which not only lets you play pinball on your CoCo, but lets you create your very own pinball game. *Pinball Factory* is similar to *Pinball Construction Set* on the Apple, and it puts new life into a very old game.

Pinball Factory comes on disk and is accompanied by a set of easy-to-read, complete instructions. I was glad to see that the disk was not copy protected and was accompanied by instructions on making a backup disk for your own use. Loading the game is as simple as putting the disk in the drive and typing `RUN "PINBALL"`. After the title page appears, you have the option of playing the current game, loading a new game from disk (eight sample games come on the disk), modifying the current game or creating a new one, saving your creation to disk, or taking a directory of the pinball files on the disk. The program requires only one drive, but can use a second drive if you have one.

Load a game by moving the on-screen pointer with keyboard, mouse or joystick to the section of the screen marked `LOAD` and press ENTER (or the joystick button) then point to the file you want to load and press ENTER again. There is no need to type in the filename from the keyboard. Because the pinball data files are stored in a special format, they do not appear on the disk directory, and the manual warns not to save any other files on your pinball diskette.

Once loaded, selecting Play from the screen lets you play the current pinball game. You then have control of the two flippers and can "tilt" the board in one of three directions (left, right and up) to make the ball go where you want it. The graphics are in black and white only, but are quite good nonetheless. The animation is good and, except for a few rare moments, flicker-free. Sound effects are adequate, but not diverse. Pause and Quit options are provided.

The area in which *Pinball Factory* shines is in the creation and modification of your own pinball games. You can control the placement of everything except the flippers; you can even design your own high-resolution graphics logo for your pinball game. You can place bumpers of varying types around the board. When the ball hits one of these, you score a certain number of points — it is up to you how many points each type of bumper is worth, as well as how many points it takes to earn extra balls — and your ball is deflected back at a fast speed. There are even "multirail" bumpers which provide bonus points if all rails are hit. *Pinball Factory* also allows you to place polygons anywhere on the board. These polygons act only as physical obstructions, yielding no points and hindering the balls. They may be used to change the shape of the playing board or increase the challenge. Once placed, any object on the board can be removed or changed, and the program provides a test option for trying out your creation. Up to 90 objects may be put on the playing field.

Once the playing field is set up, you can change the rules of the game. This includes setting the speed, the pull of gravity on the ball, the number of balls, and the elasticity (which controls how fast the ball will bounce off an obstruction). As I mentioned before, you can also change the scoring rules, thus making the games harder or easier.

Overall, this is an excellent game. Unlike past pinball games, *Pinball Factory* puts you in control of the entire pinball game, letting you tailor games to your particular liking. You can even design pinball games with friends and have a pinball marathon or competition. Because *Pinball Factory* does not lock you into a particular game, it kept my interest, as I'm sure it will yours. The only minor bug I found was that the selection (menu) pointer scrolls off the screen in one direction but not the other, which was sometimes annoying, but doesn't affect game design or play.

Suggestions? MichTron could have included more features to build a pinball game from, such as ramps, optional flippers, moving targets, etc., or a feature to let the user design his own bumpers or polygons. Letting the user create his own sound effects or background music would have put the icing on the cake, but *Pinball Factory* is a most enjoyable game as it now stands.

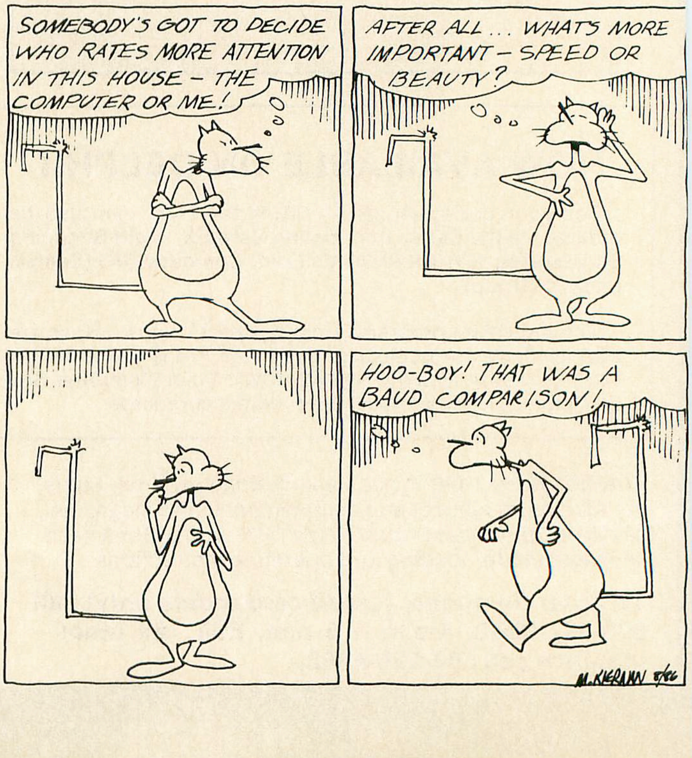
On a scale of one to five, I would rate *Pinball Factory* as follows: playability, 5; sound effects, 3; keeps interest, 4; price vs. value, 3; graphics, 4; speed/animation, 4; documentation, 4; and overall rating, 4.

As a final note, I was impressed by the trust MichTron puts in their customers. Not only was the game able to be backed up, but MichTron offers a guarantee of satisfaction and a 30-day warranty. If you even remotely like pinball, I think you can trust that you'll enjoy *Pinball Factory.*

(MichTron, 576 S. Telegraph, Pontiac, MI 48053, 313-344-5700, 64K disk required, $34.95)

— Eric Tilenius

CoCo Cat


SOMEBODY'S GOT TO DECIDE WHO RATES MORE ATTENTION IN THIS HOUSE - THE COMPUTER OR ME!
AFTER ALL... WHAT'S MORE IMPORTANT - SPEED OR BEAUTY?
HOO-BOY! THAT WAS A BAUD COMPARISON!
M. KIERANN 8/86

Darkmoor Hold: A Valuable Software Library Addition

Wandering through the dimly-lit corridors of a mysterious castle in search of adventure and riches is a daydream many of us romantics share. Until the CoCo came along, dreaming and reading were the extent of my fantasies. Now with software such as *Darkmoor Hold*, by Prickly-Pear, I can finally wander to my heart's content.

Darkmoor Hold is a graphics Adventure/Simulation that puts you, a human mercenary, in charge of a trio of adventurers hired by the ruler of a troubled kingdom. It seems an evil wizard is killing the king's beloved taxpayers and he would like you to remedy the situation. The wizard's castle, Darkmoor Hold, is comprised of 10 levels, each consisting of 20-plus rooms. You must survive all 10 levels while gathering better armament and treasure on the way. Since I was only able to get to level six, I can't testify as to what happens when you finally reach the wizard on the 10th level.

Darkmoor Hold has a different format than most Adventures on the market. In fact, it may be closer to a fantasy Simulation than an Adventure. The screen has the appearance of an ancient parchment scroll and is split into several parts. The top one-third shows a 3-D graphics representation of the rooms and corridors through which you wander. The bottom two-thirds is divided into three columns, allowing you to enter commands for each of the three adventurers. You, the human, a small but powerful Dwarf and a magical Elf make up the trio. The commands you can enter are predefined and consist of just under 20 choices. Examples are directions, search to find objects, fight to defend yourself and inventory. As my combat experience proved, 80 percent of the time you will find yourself entering fight. To call this game a slugfest would be putting it mildly. While I'm sure there are strategies to be developed, most of the time it's hard enough just staying alive.

Traveling through the various levels you face creatures of increasing power. On each level all the creatures look the same and only the Elf can correctly identify them. The graphics for the rooms and creatures are all very well-done and add considerably to the enjoyment of the game. In addition, for those of you who find spare time hard to come by, the game has a `SAVE` and `LOAD` feature allowing you to explore a little at a time.

The program is not copy protected, has a guaranteed free replacement for as long as you own it and is supported by some of the most considerate people I have ever done business with. There are many good companies selling CoCo software today and I can testify, without hesitation, that Prickly-Pear is one of the leaders.

I liked the program and would recommend it to any fantasy buff. I do feel, however, that the more experienced adventurers and role players out there might find the challenge a little too limited for their tastes. On the other hand, inexperienced adventurers who want a sample of Dungeon exploring, would do well to consider this program for their library.

(Prickly-Pear Software, 2640 N. Conestoga Ave., Tucson, AZ 85749, 64K ECB and one disk drive required, $29.95)

— Ken Boyle

Two-Liner Contest Winner . . .

This one allows you to enter the number of options on your gameboard's spinner. Then it will randomly select one. It might even eliminate those spats about how you "accidentally" bumped the spinner to alter the outcome.

The listing:

```
1 CLS:PRINTTAB(5)"ELECTRONIC DIC
E":PRINTTAB(10)"HOW MANY SIDES":
INPUT"ANY NUMBER PLEASE ";A:CLS:
PRINT"THE DICE ARE ROLLING":FORT
=1TO50:SOUND25,1:NEXTT:C=RND(A):
CLS:PRINT"YOU ROLLED ";C:PRINT"O
UT OF A POSSIBLE ";A
2 PRINT:PRINT"PRESS ENTER FOR AN
OTHER ROLL":PRINT"TO END PRESS T
HE BREAK KEY":INPUTZ$:GOTO1
```

Aaron Newell
Orlando, FL

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

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Software Review

Wizard's Castle — Great for Novices and Pros Alike

If you remember those Saturday afternoons when you lay in front of the TV and watched the Good Guys save the Princess, you have the premise of *Wizard's Castle* in a nutshell. Don't let me fool you into thinking that it will be quite as easy as that, however. This is a very pleasantly frustrating game.

Wizard's Castle, a graphics Adventure game, comes with excellent documentation. It includes a list of verbs and nouns to use in playing the game. It also covers the creatures you have to kill in order to save the Princess. Remember the descriptions of these creatures or you may try to kill one that just might help you.

One of the frustrating things that makes this game hard is not only do you have to kill the creatures, but just when you think everything is fine, the wizard brings them back to life. Even if you manage to hack the wizard to death, he can come back to life, too. Some of the creatures, like the Orc, follow you around. Others, like the Gnome, will just take all your coins, laugh and leave.

One of the saving graces is the "eerie glow;" just when you think you're going to die, it surrounds you, rejuvenates you, and the game goes on. The game also includes a help function which, if you ask the right question, will give you clues. To keep it interesting the author used riddles for the clues.

The help you receive is dependent upon your status in the game. There are three variables in *Wizard's Castle*: condition, score and experience. Condition is your physical strength and varies with how many dragons you've fought and how well you've done. In wandering around the kingdom you may find apples to eat or water to drink and they will boost your condition. And if you get lucky, the eerie glow will surround you and really give a push.

During your travels you find any of 24 different objects. If you can manage to get these back to the King, you are awarded points (either as score or experience, or both). Experience points can also be earned by actions like killing your enemies. Experience points are needed to be able to do some of the actions in the game. But, with more experience, you fall into more traps. You have the option of trading score for experience. The only thing I could not understand from the documentation was what the score points were for except buying experience.

There are three levels of play. In level one the creatures are a little easier to kill, points are easier to earn and it just seems you are luckier. Level three is hard; even moving through the game drains some of your strength away. The creatures are harder to kill, they're trickier, and traps pop up more often. The documentation states that level three should take about eight hours (or more) to play. The game is in real time, so even if you don't see a cyclops waiting when the screen comes up, don't sit still too long or he may come after you.

There are several nice features with this game, such as the Freeze command. To stop and think, you can enter `FREEZE` and the game is on hold until you want to play some more. You can also save the game you're playing onto the game disk to be able to pick up where you left off. *Wizard's Castle* will talk to you if you have a Radio Shack Sound/Speech Cartridge, but I didn't think it helped much (at least, it didn't tell me how to win). To quit, type `UNCLE`, and you can start all over.

Even though *I* never saved the Princess, I believe you will find *Wizard's Castle* well worth the money no matter what your level of expertise with Adventures. It is easy enough for those of us who play just for relaxation; and difficult enough for the die-hards who think they can master anything.

(Spectrum Projects Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, $24.95 plus $3 S/H)

— Ruth Graham

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Hint . . .

Disk Directory Printout

If you have a long disk directory and want to see all of it, or if you simply wish to have a hard copy printout of your directory, one simple command allows you to do this easily.

Just `POKE 111,254:DIR` and the entire disk directory will appear on your printer, even if it is too long to be fully displayed on the screen.

Rescue Your Disks with *Salvdisk*

Salvdisk (salvage disk) is a machine language utility for salvaging information from a damaged disk. It may be used with files consisting of BASIC, machine language programs or data. Using *Salvdisk*, you can copy one granule at a time to either another disk or a different granule on the same disk. After moving a file, you can modify the disk directory to use the data in its new location. *Salvdisk* requires a Color Computer with a disk drive and 32K of memory.

Salvdisk is supplied on a disk without the usual instructions. (But instructions *are* provided.) After doing the machine language `LOADM "SALVDISK"` and `EXEC`uting, a title page (with copyright notice) appears. At this point, press any key to continue. The second screen asks whether you desire written instructions. If you respond with a 'Y', the program allows you to select the Baud rate, and the instructions are sent to the printer. If you're familiar with the program, this can be bypassed by responding with an 'N'.

Having entered the main part of the program, you are given a choice to Load Granule, See Granule, Dump Granule, Alter Directory or Return to BASIC.

Load Granule reads the specified granule's contents into CoCo's memory. (Granules one through 68 store files; granules 69 and 70 comprise the directory.)

See Granule displays the contents of a previously loaded granule one sector (256 bytes) at a time. The display, however, is generally illegible — showing primarily graphics patterns and an occasional identifiable character.

Dump Granule allows you to write a previously loaded granule into a new granule of your choice. You may want to write it to the same granule number on another (undamaged) disk, or write it to an unused granule on the damaged disk.

Alter Directory allows you to update the directory after moving a granule (or granules) around. Without this step, the computer would not know where to look for the relocated file.

Return to BASIC allows you to test modifications without having to turn off the computer and accessories. This is convenient because a test file (called "try it") is created when you modify the directory. By using `EXEC`, `RUN` or `read`, you can confirm the correctness of your work.

Being a relative newcomer to the world of disks, I have not (yet) crashed a disk. But I know it's just a matter of time, so I welcomed the opportunity to review this program. Unfortunately, I was disappointed. In order to use *Salvdisk*, it is imperative to be able to identify the granules associated with each file. This task would be easy if I could use the program to read the contents of each sector and granule, but the resulting display when I "view" the granule is predominately graphics patterns with only rarely identifiable characters.

I tried this program with both binary and ASCII files without success. I called the author to discuss my difficulty, and he explained that this was normal. He also explained that determining the granules that contain a program is accomplished through trial and error. And to further complicate the salvage procedure, the granules must be relocated in correct order, while the order on the damaged disk is not necessarily consecutive — the granules comprising a program may be numbers 34, 35, 50 and 26. When salvaging these, they must be relocated in the correct sequence. In other words, I have to write granule 34 first, then 35, then 50, then 26 to consecutive granules on the new disk — 10, 11, 12 and 13, for example. And, the correct order can only be determined through trial and error.

I also tried, unsuccessfully, to identify the starting granule of the test program by reading the directory (using the read granule activity on granules 69 and 70, as specified in the instructions).

The two pages of instructions are neither complete nor well-written, but are sufficient to experiment with the program.

In summary, attempting to use this program reinforces the necessity of making frequent backups of critical disks. The distribution of *Salvdisk* is unique, in that the author has not set a price; rather, he will send you a copy of the program if you send him a formatted disk. When you execute the program, one of the opening screens explains that the author would appreciate a donation if you find *Salvdisk* useful.

(Free CoCo Software, P.O. Box 2231, Westover, WV 26502)

— Jerry Oefelein

BASIC COMPILER

WASATCHWARE believes that users of the Color Computer deserve the right to use all 64k of RAM that is available in the computer, and have fast machine language programs that use the full potential of the 6809 microprocessor. That is why the BASIC compiler, called MLBASIC was developed. Here are some of the reasons that make this compiler one of the best bargains in this magazine:

- Use all 64k of RAM for program storage and/or variables
- Full Floating Point arithmetic expressions with functions
- Full sequential and direct access disk files allowed
- BASIC source and M.L. output I/O to disk, tape or memory
- Many new commands that expand your programming capability

Commands Supported

1. I/O -Commands

CLOSE	CLOADM	CSAVEM	DIR	DRIVE	DSKI$	DSKO$	FIELD	FILES
GET	INPUT	KILL	LSET	OPEN	PRINT	PUT	RSET	USING

2. Program Control Commands

CALL	END	EXEC	FOR	STEP	NEXT	GOSUB	GOTO	IF
THEN	ELSE	ERROR	ON..GO	RETURN	STOP	SUBROUTINE		

3. Math Functions

ABS	ASC	ATN	COS	CVN	EOF	EXP	FIX	INSTR
INT	LEN	LOG	LOC	LOF	PEEK	POINT	PPOINT	RND
SGN	SIN	SQR	TAN	TIMER	VAL			

4. String Functions

CHR$	INKEY$	LEFT$	MID$	MKN$	RIGHT$	STR$	STRING$

5. Graphic/Sound Commands

COLOR	CLS	CIRCLE	DRAW	LINE	PAINT	PCLEAR	PCLS	PLAY
PMODE	PRESET	PSET	RESET	SCREEN	SET	SOUND		

6. Other/Special Commands

DATA	DIM	LLIST	MOTOR	POKE	READ	REM	RESTORE	RUN
TAB	VERIFY	DLD	DST	IBSHFT	LREG	PCOPY	PMODD	PTV
REAL	SREG	SWP	VECTD	VECTI				

Compiled Program Speed (Time in minutes:seconds)

Program	Interpreter	MLBASIC
Eratosthenes Sieve	6:58.7	0:06.3
Matrix Fill,Mult,Sum 10x10	0:30.9	0:02.5
String Manipulation	6:22.5	2:17.7
Floating Point	0:32.6	0:30.6
Disk I/O (2000 PRINT/INPUTs)	2:21.5	0:27.6

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Action-Packed *Rommel 3-D* Requires Practice

With anxious hands, you hold the controls of your death machine in hopes of finding the enemy. The mission appears simple, but you know in your heart that this will be one of the harder missions you face.

Rommel 3-D is a game of speed and skill. You have a tank that must seek and destroy other tanks and planes trying to destroy you. As you destroy them, you receive points and if you gain enough points you receive bonus tanks. The challenge is to develop a strategy that enables you to increase your scores constantly.

A joystick is not needed to run the game. Use the arrows, or the 'P', 'L', 'W' or 'Q' keys to move and the space bar to fire the cannon. Scoring is accomplished by directly hitting the enemy tanks or planes. Points are given for hitting three different things: dumb tanks worth 1000 points, smart tanks worth 1500 points and planes worth 1300 points. You receive one bonus tank for every 10,000 points you get until 100,000 points after which it takes 20,000 points to get a bonus tank. On the screen you see flat land with mountains on the horizon. Scattered around this land are various obstacles you cannot move through. The enemy vehicles are three-dimensional tanks or airplanes in various colors. In the middle of the screen are the sights for your tank. They become smaller when an enemy tank or plane is in firing range. In the upper right hand corner there is a radar screen. Your tank is the center of that screen with other vehicles appearing as blips in relative position to you.

The only way to win at this game is to practice. If you get in trouble, move your tank backwards and to the left or right very fast and maybe you won't get hit. The only strategy that worked for to me was to keep moving.

When I played this game I got killed very fast at the beginning, but as I played I did get better slowly. The game is a challenge, fast moving and fun. If you are into action-packed war games then this game is worth looking at.

(MichTron, 576 S. Telegraph, Pontiac, Michigan 48053, 313-334-5700, 32K required, disk $29.95)

— Thomas E. Nedreberg

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Clever Animation in *Adventure in Mythology*

Fans of graphics Adventure games will enjoy Saguaro oftware's new game, *Adventure In Mythology.* The 64K achine-language game is available on tape or disk. The isk can be backed up, but the backup copy will not run. n loading the backup copy, you get a message that says e files can be recopied to the original disk if necessary.

The game does not load from JDOS or from the disk ersion of ADOS. I had no problem with DECB 1.0. ccording to the instruction sheet, the game can be used ith the Tandy SSC Speech Sound Pak. But even without at accessory, the game is not totally silent — there are its of music and sound effects built in.

Adventure In Mythology comes in a simple, yet most ttractive package. The instructions are short and to the oint.

The graphics are cleverly animated. For example, when ou are in a rain forest, you can actually see the rain coming own. If you have a key to open the castle door, you see t open up.

As the name of the game implies, the Adventure is based n the popular tales of ancient mythology. Among the haracters you encounter are King Minos, Ariadne, Icarus nd Galatea, just to name a few. "Your goal," we are told, is to win the hand of the beautiful Atalanta, the swift-unning huntress." I never got to meet her, though, because kept getting mugged by bandits, trapped in inescapable ooms, drowned in the ocean and tripped up in the darkness f the famous Labyrinth.

Like other games of this type, *Adventures In Mythology* an take many hours to play, so you'll find the ability to ave a game in progress and reload it later very handy. The isk actually allows ten different saves — so you can save one game at several landmarks along the way. Then if you get killed, you can go back to any of those saved points and try again from that point.

(Saguaro Software, Box 1864, Telluride, CO 81435, tape $24.95, disk $27.95)

— Neil Parks

Hint . . .

What's Your ROM Version?

With all the talk about new ROMs, you may be wondering exactly which ROM you have. If you have an older CoCo with Extended BASIC, just read the version number of your Extended BASIC at the top of the screen on power up. Then, to see which Color BASIC ROM you have, type `EXEC 41175` and press ENTER.

If you have the new ROMs, Extended BASIC will be Version 1.1 and Color BASIC will be Version 1.2.

On the CoCo 2, Color BASIC will always be Version 1.2 or 1.3 (which are functionally identical).

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Take a Chance — Play *Skance*

Do you like games of chance such as Yahtzee or dice? Dc you like to go one-on-one with your computer and sometimes win? If so, you're a likely candidate for *Skance*.

The program is written entirely in BASIC and requires a 16K CoCo with Extended Color BASIC.

When I ran the program, the instructions were simple and straightforward. Besides the instruction screen, there are four other screens you will use: The Player Screen lists all of the players, the Score Screen shows the current scores, the Dice Screen shows the dice being rolled and the Winner Screen gives the winner's name and score.

After the instructions, you are asked how many people will be playing. Up to four people can play or you can play against the computer.

The object of the game is to score as many points as possible. To score, you need to stop rolling the dice before your point number comes up a second time. Your point number is the first number you rolled.

The game consists of seven rounds of play. After the seventh round, the winner's screen comes up and displays the winner's name and score. Although the computer keeps track of all players' scores and who is playing, once a player begins rolling the dice, there is nothing displayed on the screen to tell the players who is rolling. We found this to be a problem.

After you decide how many people are going to play, the screen indicates whose turn it is. There are two options: press the 'A' to roll the dice or press the 'S' to see the current scores. If the 'A' is pressed, a screen comes up showing two dice. After each roll, you are given three choices: roll again, see score, or next player. These are chosen with the 'A', 'S' and 'N' keys. If any other key is pressed, your turn ends and the next player is up.

This game requires no skill to play, but if you like games of chance, this may be for you.

(Bob's Software, P.O. Box 391, Cleveland, OH 44107, send formatted disk and return postage.)

— John H. Appel

One-Liner Contest Winner . . .

Here is a tricky one. Use your joystick to move the racer through the course. Watch out for the obstacles!

The listing:

```
0 POKE65495,0:CLS0:A=1248:B=9:C=
128:FORT=0TOA*A:POKE1472+RND(30)
,96:D=2-RND(3):FORS=0TO4:B=B+D:B
=B-(B=0)+(B=19):POKER,C:R=JOYSTK
(0)/2+A:PRINTSTRING$(B," ")STRIN
G$(13,CHR$(C)):IFPEEK(R)=C THENP
OKER,86:NEXTS,T ELSECLS4:PRINT"T
IME="T;:PLAY"O1L3G2":RUN
```

Lonnie McClusky
Toney, AL

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

Portraits of Christ Presents the Gospel of John

Get out your copy of *2010* by Arthur C. Clarke and you'll see in the introduction he reveals that the entire text of this novel was mailed from Sri Lanka to New York on a single diskette. He was heralding the arrival of the age of technology. Now, in the same tradition, is the book I received for review from Sovereign Grace Software, *Portraits of Christ*.

Two CoCo-formatted diskettes contain ASCII text files which can be loaded by your word processor and read on-screen or printed out. Both the documentation and an introductory file explain the screen and printer formatting necessary for proper hyphenation and paging. Using *Telewriter*, all files loaded without a hitch. Following the formatting parameters produced a well-organized screen layout of 63 characters per line and a printout properly paged and aligned. (A call to the author, Pastor Mark Camp, indicated that the disks now contain a program *APrint*, that can be run to get a hardcopy without a word processor of your own.) There are 21 chapters plus a title page and disk information file.

The book is essentially a discussion of the New Testament Gospel of John. It presents the idea that a unique aspect of Jesus Christ is emphasized in each chapter of John. Sample titles include "Jesus Christ — Consoler" and "Jesus Christ — King."

In the 15th century, the Spanish mystic Fray Luis de Leon published a work called *Los Nombres de Dios* (The Names of God) which approached the idea with the same method for the entire Bible. But *Portraits of Christ* is not just a theological discussion. The nature of *Portraits of Christ* can be accurately described as fundamental Christianity. Its stated purpose is evangelical.

I got the feeling that each chapter may have originally been a sermon delivered by its author. Each chapter concludes by directly addressing the reader to encourage a decision of a spiritual nature.

To sum up this offering by Sovereign Grace Software without bias, it is a literate, well-prepared presentation of the Gospel of John written for the purpose of teaching about the nature of Jesus Christ from a perspective of evangelical, Protestant Christianity.

Pastor Camp told me that he would like $10 for the two-disk set but admitted he is willing to accept donations of any amount as well. He is, not surprisingly, more interested in spreading the word than reaping profit.

(Sovereign Grace Software, 221 Highview Dr., Ballwin, MO 63011, 64K disk $10)

— Dennis A. Church

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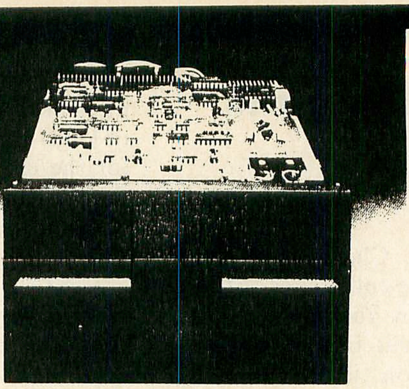

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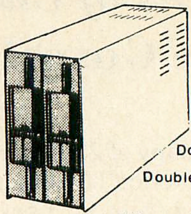

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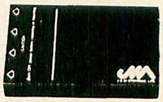

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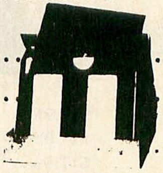

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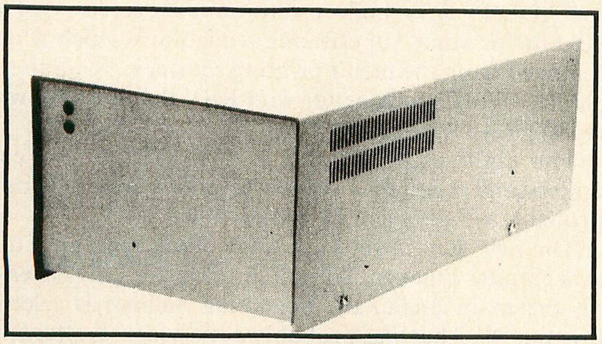

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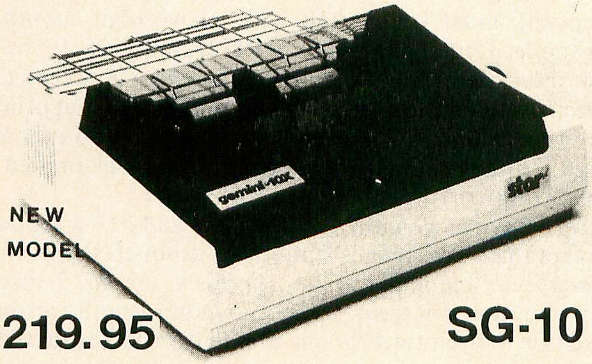

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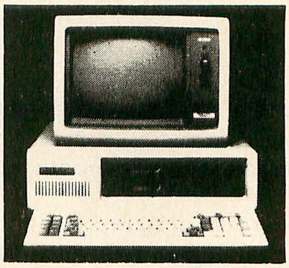

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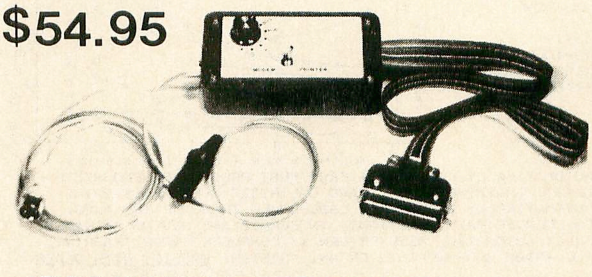

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Check out *Computer* and *Business Bankbook*

By Neil Parks

Sunrise Software has two new programs available that not only serve as check registers, but also print checks. If you pay the same creditors every month, this could prove to be a real work saver.

Computer Bankbook is designed for home users. *Business Bankbook* — available in two versions — is a similar program designed for business users. Both programs are 100 percent BASIC and come on disks that can be backed up. Both come with a "code plug." This bit of hardware plugs into the right joystick port, and without it the program is unable to run.

Since *Computer Bankbook* is a BASIC program with no machine code, it should be compatible with all operating systems, but it isn't. The disk I tested appeared to run properly under JDOS, but certain data fields, which I wanted to leave empty (as permitted by the program), were filled with random garbage. Attempts to edit the data via the program's edit routine resulted in various crashes and/or loss of entries.

I had no problems with DECB 1.0 or the disk versio of ADOS, so I presume that the problem with JDOS i caused by differences in direct-access disk formatting, bu I don't know. Copying the program to a JDOS-formatte disk did not help.

The program ends by cold-starting the computer (`POKE 113,0:EXEC 40999`). With the disk version of ADOS, there is garbage on the screen, but pressing the Reset button restores the built-in DOS. *Computer Bankbook* is a natural for ADOS's RSV high-resolution text screen — or would be, but for some superfluous semicolons which should be removed from the menu-printing routines. The Edit screens actually work much better with RSV than they do with the regular 32-by-16 display.

The eight-page manual is well-written and easy to understand, though a couple of points were left out that probably should have been mentioned.

The first step in setting up the check register is to enter a beginning balance. Although there are only seven items on the main menu, the beginning balance is selected by pressing '8'. That was probably done because, after entering the balance, you won't use that routine again for a year.

There are two ways to enter checks. If you are going to have the computer print your checks, you use the Check Printer routine. When each check is printed, it is automatically entered into the register. For creditors you pay on a regular basis, enter their names and addresses into a file. Then every time you want to send a check to one of those creditors, you call up that file. Enter the last check number used, and the check or checks printed are properly numbered.

There is also the option of special checks, for which the name and address of the payee is not stored in the file.

The second method of entering checks in the register is also the method for entering deposits — the Add Checks/Deposits Manually selection. The manual suggests that you may wish to use the Check Printer routine in preference over the Add Manually option even if you don't plan to have the computer print your checks. Personally, I disagree. I found the Add Manually option much easier to use.

(The manual says that if you wish to use the Check Printer routine without actually printing checks, you must change one line from a `GOSUB` to a `REM`. What they forgot to mention is that this change affects only the regular checks, not the special ones.)

Although the manual doesn't make it clear, all checks and deposits must be entered with a two-digit month. For example, January 25 has to be 01/25, not 1/25. If you enter the month with only one digit, the entry is accepted, and the check is printed properly. But the routine that prints out the transactions for a particular month keys on those two digits, so any entry with a one-digit month is omitted from the listing.

The day can go either way — 12/4 and 12/04 are equally acceptable. The year is optional. Although the *Computer Bankbook* manual doesn't expressly say so, it becomes obvious that one year is the maximum length for the file, because the printout for one month doesn't key on the year.

All entries for a given month must be consecutive. Otherwise, the balance column in the printout for that month will look strange. This may cause a slight problem if you write a lot of checks early in the month, before you get your statement and find out how much interest you

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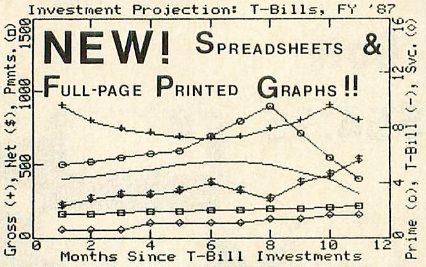

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arned for the preceding month. But you can always date he interest deposit as of the first of the new month to get round that. Again, this is a point that should have been nentioned in the manual but wasn't.

Each check is considered to be outstanding until you ndicate, either on entry or editing, that it should be canceled cleared). When you get your monthly statement from the ank, just print out a list of outstanding checks. A total will e printed with it. Add that total to the present balance and, f it agrees with the bank's balance, you've made balancing our checkbook quick and easy. (Deposits are considered anceled on entry, but you can always edit one to outstanding if it occurred too recently to be on the bank statement.)

Each check and deposit may be assigned an account umber. Here's where the program really proves its value. You can print out a list of transactions for each account umber, for any one month or for the entire file, and the ist will be automatically totaled. For example, let's say all our checks for charitable organizations are assigned to ccount 18. Tax time comes and you want a total of haritable contributions — it's as easy as printing out ccount 18 for the year. For this feature alone, *Computer Bankbook* is well worth twenty bucks.

There are a few quibbles, albeit minor ones. Author James Goldsberry did not make allowances for writing a check larger than $999.99. The program can handle it, but the printout looks strange because it exceeds the "print using" format. (Four-figure deposits and balances look OK.)

There is a slight inconsistency in those routines that require a Y/N response. In some of them, the ENTER key is interpreted as Yes, in others as No, and in yet others as no response. Obviously the third situation is the most desirable and should have applied in all cases.

When you enter the beginning balance (via menu option 8), I suggest you enter the amount as zero. Then, as your first transaction, post a deposit in the amount of the balance. Use the edit function to change the name from "deposit" to "beginning balance" or "balance forward" or whatever. That way, if you ever need to recall the file for a prior year, you don't have to make any adjustment to the beginning balance. This method lets you use the same disk for more than one checking account at the same time — your personal account, your spouse's account, a joint account, etc. When you finish working with each account, just copy the `CHECKS.INF` file to a library disk under the name of your choice, and recall the one wanted by killing `CHECKS.INF` on the system disk and copying the appropriate file in its place. You can have several years for several accounts stored on one library disk. That makes more sense to me than creating a new system disk for each account file, as the standard procedure would require.

Business Bankbook is essentially the same program, with a few added features. The main difference is that instead of assigning each transaction to one account, you can assign up to four accounts. So if an invoice includes merchandise cost, freight and tax, for example, each of these components can be posted to its own account. Enter the amount for each account, and the total is calculated automatically.

Business Bankbook comes in two different versions. System I (also known as Bank 7.1 or 7.3) uses one disk drive. System II (alias Bank 9.1 or 9.3) assumes two drives — one for the system disk and one for data storage. The beginning balance entry appears on the menu in *Business Bankbook*, but works the same as in *Computer Bankbook*. (With System II, my alternative method of the zero beginning balance becomes even more useful: You don't even have to kill and copy files to go from one to another. Just rename the appropriate file on the data disk to or from `CHECKS.INF`.)

The 10-page manual for *Business Bankbook* was apparently written some time after the other one, because it does mention that each file should contain one fiscal year, and it does not suggest using the check printer routine to enter checks without printing them.

I did not test *Business Bankbook* under the non-Tandy operating systems, but since the two programs use similar direct-access disk I/O routines, I would expect the results of such a test to be the same as they were for *Computer Bankbook*.

Business Bankbook allows you to enter a table of Active Accounts, consisting of any account numbers you regularly use, and a name for each account. This chart can be printed out at any time, and will appear in numerical order even if you didn't enter them in order. Also, the account names in the table appear on the check vouchers.

Unfortunately, there are two bugs in this routine. In the Edit mode, you are asked if you want to change the account number or account name. But any change in the account name erroneously produces a random change in the number, and any attempt to change the number fails. Also, if you use an account number that is not in the table, the check printing routine puts an inappropriate name in instead of a blank space. There is one line on the System I program that says `RUN BANK.10`. However, BANK.10 is a file which occurs only in System II. Somebody didn't debug as thoroughly as he should have.

On the plus side, by the time *Business Bankbook* was written, Mr. Goldsberry corrected the inconsistency in his Y/N routines, so that only a 'Y' or an 'N' would be accepted as a response.

Business Bankbook also has a routine called Convert that allows you to convert your *Computer Bankbook* files to the *Business Bankbook* format if you want to upgrade. The *Business Bankbook* manual says that a *Computer Bankbook* file of about 300 records takes seven granules of disk space. After conversion to the *Business Bankbook* format, the same data occupies eleven grans.

The manuals for both *Computer Bankbook* and *Business Bankbook* state that the check printing routines are expressly designed for use with Nebs Computer Forms tractor feed checks #9025-1, and that Line Printer VII, DMP-100, and possibly other inexpensive printers can't handle such heavy paper.

With each program comes a checklist to fill out and send in if you have occasion to write to Sunrise Software. "Please outline the problem you encountered in as much detail as possible," says Sunrise. "We will do all we can to help you solve it." I like that.

(Sunrise Software, 8906 NW 26 St., Sunrise, FL 33322, *Computer Bankbook*, 32K, one disk, $19.95; *Business Bankbook*, specify System I for one drive or System II for two drives, $49.95; $2 S/H)

New Modem Pak is 'Interesting'

The new Modem Pak from Radio Shack is quite an interesting piece of equipment. As a hardware item it exhibits a concept that is very useful to the Color Computer user. Imagine, a modem you just plug into your CoCo's cartridge port.

Those who have learned the hard way and upgraded from Commodore to the CoCo may remember the old Vic modem. This new modem from Tandy goes a bit further than that one, though. The old Vic modem required the use of a tone capable telephone with a removable handset. The Modem Pak works with either a tone or rotary line and is direct-connect. Just plug the modem into the phone outlet and dial the number with your family phone.

The Modem Pak is a good, basic telecommunications package all wrapped into one small plastic case. It includes the interface to its internal 300 Baud modem via a 6551 ACIA. It also includes communications software in ROM.

The Modem Pak is very easy to operate. If you are using the Multi-Pak Interface, you can put the Modem Pak in slot one, two or three, and then set the selector for the appropriate slot. If you are not using the MPI, just plug the Pak right into the side of the CoCo. Then plug the unit into the phone line, type `EXEC &HC000` and you are ready to go. A menu of options appears on the screen. If you press the space bar, a second menu appears. Press it again to return to the first menu.

Several options are included in addition to the standard parameter options. Besides being able to alter the standard communications parameters, you can adjust the printer Baud rate, Xmodem timeout, cassette and printer buffer sizes, and turn the ASCII filter on or off.

The internal software lets you switch the printer Baud rate between 600 and 1200 Baud. Unfortunately, it does not allow you to go any higher than this. My printer likes to operate at 9600 Baud.

The Modem Pak does allow the use of the Xmodem protocol for file transfer. However, any files to be transmitted must be in ASCII format. Also, there is no provision for the user to supply addresses if he or she wishes to save a machine-language program from the buffer to a tape. I found this implementation of Xmodem to be very awkward, primitive and limited. It would still be advisable for users of this product to transfer files using the ASCII transfer method, which seems to be pretty reliable.

The ASCII filter option is very useful. When this optio is turned on, all control characters are stripped from th transmitted data. Any characters over 80 Hex are filtere out. If you want to transmit data containing graphics code or special key codes, just set this option to "off."

A very interesting feature of the Modem Pak is its "dua combined" buffer. When communicating, there are tw buffers; a cassette buffer for data you may want to save an a printer buffer for sending data to the printer. The tota combined buffer space may not be more than 28K, but yo can use any configuration of cassette and printer buffer size not exceeding this limit. I found that, under most circumstances, a printer buffer size of 1K is more than enough The only time data stays in this buffer is if the printer i offline. Otherwise, if the printer function is turned on, a received data is immediately sent to the printer as well a the screen. This is great for getting a hard copy while online

With the cassette buffer, you may save or load data t or from tape, clear the buffer, or view its contents. Thes features are very useful additions to transmitting data from or receiving data into the buffer. They will benefit mos users.

A feature that will benefit CoCo owners with 'B' revision CoCo 2s is the true lowercase option. If your CoCo is se up to use the new VDG Tandy has been using, the Modem Pak can recognize this and be set so that you get true lower case during communications.

One thing I thought was poor was the lack of suppor for disk systems. As it stands, the Modem Pak works only with tape-based systems. This is because the software in ROM makes it very difficult to work with the disk. The uni is set up so it can operate under OS-9 version 2.00.00 provided you have the M1 or M2 driver and the appropriate descriptor installed. In this case, it will work with a disk system. Who knows? Maybe Tandy has some future terminal package software plans in mind. It sure would be nice, however, to use this package under Disk Basic.

The ROM based operating software of the Modem Pak is much enhanced over that included in the Deluxe RS-232 Pak. The unit itself is a great step in the right direction. However, I feel certain additional features would have increased the value of this product. For instance, inclusion of an RS-232 jack on the side would have allowed use with external modems. Along with this, Tandy might have included a provision for altering the communications Baud rate when using an external modem. With prices dropping, many people are going the extra bit and buying 1200 Baud modems. It is a shame they won't be able to use them with the Modem Pak. Also, I feel the inclusion of what Tandy calls Xmodem is nothing more than a waste of good ROM space. They might as well have left this "feature" out.

Despite any shortcomings, the Modem Pak is a well-built piece of equipment. The documentation is more than adequate and covers all phases of operation. In their usual style, Tandy has included the schematic and programming examples for controlling the modem in BASIC or assembly language. I can recommend this unit for those who do a moderate amount of telecommunicating. Its relatively low price far outweighs its shortcomings for these people. I'll give the Modem Pak a three-star rating on my four-star scale.

(Tandy Corp., available in Radio Shack stores nationwide, $89.95)

— Cray Augsburg

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CoCo Adapter-required for CoCo (J110K)	$15
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*requires J107K I/O Port kit	
Stand Alone 6809 CPU Board (MX 90)	$40
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ARK ROYAL GAMES

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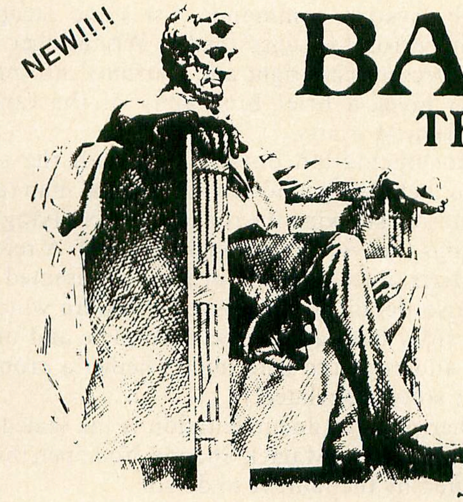

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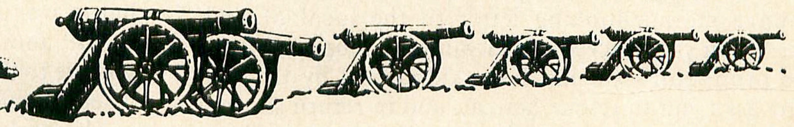

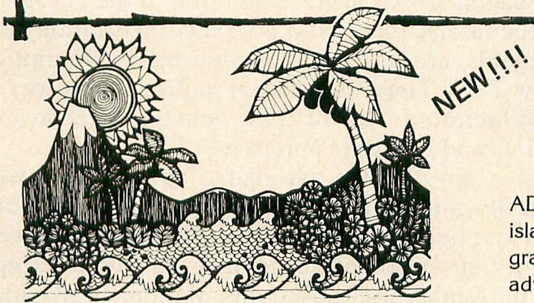

NEW!!!!

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WATERLOO 32K ML routines. Semigraphic wargame. Mar. '84 Rainbow.—$15

KAMIKAZE 32K Hi-res graphic wargame. Apr. '83 Rainbow.—$15

BOMBER COMMAND 32K disk, 16K tape. Semigraphic wargame. ML routines. Jan. '84 Rainbow.—$10

GUADALCANAL 32K Semigraphic wargame. ML routines.—$10

ARK
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Prices on all programs include shipping to U.S., APO's, Canada. COD's (USA only) add 10%. Florida Residents add 5%. For disk version add $2. All Orders shipped within 24 hours. Programs require Color Computer TM (Tandy Corp.) or TDP System 100 Computer TM (RCA). Many programs soon to be available on MS-DOS systems.

P. O. Box 14806
Jacksonville, FL 32238
(904) 786-8603

Interactive *Wishbringer* — A Stimulating Challenge

On a scale of one to 10, I'd give *Wishbringer* 9.95+ points. *Wishbringer* is an interactive fantasy — you interact with the program to create a story with many possible solutions. Unlike many Adventure games, which accept only two-word phrases (typically a verb and object), *Wishbringer* encourages you to talk to it in complete — even compound — sentences. Every aspect of this package has been carefully designed and implemented.

To enjoy this fantasy, you need a CoCo 2 with 64K of memory and a disk drive. Optional items include a second disk drive and a printer.

The object of this fantasy is to free the seaside village of Festeron of trolls, vultures and fortress-like towers. At the fantasy's beginning, you are a postal clerk, with the task of delivering a strange-looking letter to the local Magick Shoppe. When you succeed in reaching the shop, you learn that the proprietor's cat has been kidnapped by the Evil One. She asks you to rescue her cat, and in return she will give you a stone with magical powers — Wishbringer. Upon leaving the Magick Shoppe, you discover that the once quiet and peaceful village has become a battleground between the forces of good and evil. Only you, with the magical assistance of Wishbringer, can rid the town of its evil inhabitants.

The documentation supplied with this program is superb. The 25-page, color instruction manual contains the legend of Wishbringer and complete operating instructions. Suggestions are presented for the novice, and even a sample script is included to illustrate how the fantasy develops. Instructions are given to save a position in the fantasy and to restore to that point. Additional instructions allow you to send the actual script you create to the printer. Appendices describe system commands, list some recognized verbs, explain error messages (called Wishbringer Complaints), and present copyright and warranty information. Appendix G gives a brief biography of the fantasy's originator, Brian Moriarty.

But the documentation doesn't stop with the superb manual. Also included is a poster-sized postal map (also in color) of Festeron, showing the roads and identifying many of the buildings (but not the Magick Shoppe). A reference card summarizes much of the information presented in the manual. It also details a diagnostic procedure which will check if the story data are correct (complete and undamaged). (This allows you to determine whether a problem is hardware- or software-related.)

Still another piece of documentation is the sealed letter you are to deliver to the Magick Shoppe. You open this only when instructed by the fantasy to do so.

The packaging is excellent. In addition to the documentation, Infocom has included a warranty registration card (submitting this card gets you a complimentary subscription to the New Zork Times newsletter) and several pieces of advertising literature. One of these announces the availability of hints and maps for purchase.

Although I am past the age that is so fascinated with games, I really enjoyed doing this review. I was constantly challenged and frequently surprised as the fantasy evolved. The documentation left nothing to my imagination (except, of course, the fantasy itself). Response was quick, and often revealed the author's sense of humor.

(Infocom, available in Radio Shack stores nationwide, disk $34.95)

— Jerry Oefelein

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RAINBOW CERTIFICATION SEAL

Two-Liner Contest Winner . . .

Pick Me is rather interesting, but you'll have to type it in to find out what it does.

The listing:

```
5 CLEAR500:PMODE4,1:SCREEN1,0:PC
LS:DRAW"BM71,108;C1;L4H4U12E28R6
4F28D12G4L4;BM92,0;D65R64U64;BM1
84,96;R15E5U7L12H8L15;BM80,160;D
12U6R6U6D12R1C0R4C1U12R12D12L12R
13C0R16C1U12D6R6U6D12R1C0R4C1U12
D12R6U12D12R1C0R4C1U12F4E4D12"
10 N$="D12RD10RD8RD7RD6R12U7RU8R
U10RU12H4L12G4":K$="UEU2E2U2E2U2
R11D2F2D2F2D2F":FORY=88TO104 STE
P16:FORX=71TO155 STEP28:C=INT(Y/
104):Z=ABS(Y-192):DRAW"BM=X;,=Z;
C0;"+N$+K$+"BM=X;,=Y;C1;"+N$+"C=
C;"+K$:NEXTX:NEXTY:GOTO10
```

Tim Buck
Akron, OH

(For this winning two-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

Keep in Touch with *Mailing List/Data Information*

A number of mailing list programs, capable of storing addresses and printing on self-sticking labels have been available over the years. *Mailing List/Data Information* by Crockett Software, offers several unique features that make it attractive. It can store and sort a large number of addresses, store additional data for each address, sort by number or letter, and can rapidly search using key words or numbers.

My review copy of this program arrived on cassette tape which is easily converted for disk operation. I would strongly recommend disk operation because of the ease of computer/disk interaction versus the difficulty of storing and updating data on tape. The program requires a slight change in a statement (AO$=DISK from TAPE) to convert to disk. The programmer did an excellent job in making the program so easily convertible.

Mailing List/Data Information contains two programs. The first, *PCEXT* must be run first if you have Extended BASIC to condition the computer. Then run *GEMLIST* which is the operating program. The program runs on 16K or 64K systems with or without Extended BASIC. The number of files available is limited by RAM size. Two hundred files are available for 64K.

The manual is well-written with good, easily followed instructions. It contains a useful appendix of states and commonly used abbreviations, a tapedisk routine for converting tape data files to disk and a merge program for combining two or more records.

On running the program, the user is given the option of creating records or loading recorded data. Input is in the form of a name, three address lines and three data lines. The name is entered with last name first, but a print option allows it to be printed first name first. Commas may not be used. One may use all or a part of the address lines. The data lines, which are not printed for labels, are useful for telephone numbers, occupation names or other descriptive information. This is particularly useful in the search routine where you can call out by address or data item.

The program locates records by I.D. number, name or any term used. It sorts files by file number, name or ZIP code. It also allows editing of all input for changes of address or any input data changes. Files may be reviewed at varying rates of scrolling.

Storing files is easily accomplished using the Record command. Retrieval is facilitated by an automatic DIR which displays stored filenames.

Printing can be for all addresses and data or addresses alone. When printing labels, the Address Only option is used. The program prints two self-stick labels across a page, or single labels. It also prints on one-inch or one-and-one-half-inch labels. One minor irritation was a printed statement following label printout of the number of labels printed, which wasted a label and upset the spacing for more labels. I eliminated that irritant by changing Line 66 in *GEMLIST.*

Need your plumber but can't remember his name? Locate the file with "Plumber" in the data. It would also be useful for Church or other organization mailing lists, small businesses (or larger ones), anywhere you want to file and maintain names, addresses, and pertinent data.

As far as program limitations are concerned, it will store up to 200 records for a 64K system. However you can maintain several 200 record files on a disk by simply using a different filename for each one.

I would recommend this program for maintaining your address and telephone files. It is the best that I have seen because of its speed and multifeatured capability, particularly the Locate and Sort capability.

(Crockett Software, P.O. Box 1221, St. Ann, MO 63074, tape or disk $29.95)

— Mel Siegel

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#1005	$169.95	Banker II (512K) assembled & tested with memory
#1006	$15.00	Memory Expansion Board
#1007	$29.95	Memory Expansion Board + parts
#9000	$89.95	Down Under Controller. Ram Pack size controller with BDOS Gold plated, high reliability edge connectors, jumpers for 24/28 pin ROM. Compatible with COCO I and COCO II.
#9001	$35.00	BDOS (Enhanced DOS on 27128 EPROM)
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A2D Deluxe Joystick: What More Could You Ask?

The A2D Joystick is slightly larger than the standard CoCo joysticks I'm used to. It's about the size and shape of other deluxe joysticks on the market, which is to say just about right. It appears to be well and sturdily constructed. The firebutton has more "throw" than the run-of-the-mill model, and has a very positive action.

Unobtrusively tucked away on the bottom of the case are two small dial-type switches that control the modes of operation. A flip of a switch allows self-centering operation or free-floating operation. The two axes are controlled independently, so the horizontal can be free-floating while the vertical is self-centering (or visa-versa).

The mechanical trim adjustment for each axis is accomplished by way of two slide switch mechanisms located on the top of the case. These slides are stiff enough to prevent accidental adjustment. To test the operation of these trims, I wrote a short BASIC program to display the integer (zero to 63) returned by JOYSTK(0) thru JOYSTK(3), as determined by the positions of the horizontal and vertical axes of both joysticks. In the free-floating mode, centering the trim control allows the full range of zero to 63. Maximum trim adjustment shifts these values by approximately 23 (zero to 40 or 23 to 63). In the self-centering mode, the trim allows adjustment of the "position" returned to by the centering mechanism. The centering mechanism seems to be very precise. Once adjusted to a certain number with the trim adjustment, the centering always returns to that number.

Using the same program mentioned above, I tested the A2D against the common garden variety RS joystick. With the RS it was difficult to move smoothly one number at a time. It was also difficult to stop on a chosen number — I got the feeling that a sneeze two doors down might change the display from 39 to 40. With the A2D, however, one step at a time was a breeze. In free-floating mode I could stop on 39 and set the joystick down on the desk without affecting the display. This level of precision must be an advantage for any application. *CoCo Max* came immediately to mind. While I was not able to test it with *CoCo Max*, I'm certain the additional control offered by the A2D would be very helpful with a system which allows joystick control of the entire 256 by 192 Hi-Res screen.

A2D: what more could you ask of a joystick?

(Cinsoft, 2235 Losantiville Ave., Cincinnati, OH 45237, $27.50)

— Stanley Townsend

See You at
RAINBOWfest-Princeton
October 17 - 19

Master Disk — A Simple Program to Catalog Files

Master Disk assists in cataloging all your disk files. It requires 32K and is based on a program by Paul Selig in the December 1983 issue of THE RAINBOW. *Master Disk* will create, sort and save a disk library of filenames. It can hold up to 18 directories or 250 program names in a single file. Multiple files can be created so you can catalog all your disk files.

After correcting four bugs, I found this program easy to use, and it does its job well. The bugs were minor and probably caused by the author trying to strip out spaces, etc. I have reported these to the author and I'm sure they will be cleaned up by the time you read this review.

Master Disk is menu driven and provides good on-screen prompts. There are two menus. The main menu allows you to create a new directory or recall an existing directory. The activity menu allows you to add to file, find a selected program, review entire file, or save to disk. *Master Disk* will record the disk filename and extension and the disk name (up to nine characters) for each file.

Reports can only be printed to the screen. When looking at the screen reports, 10 files are displayed at a time.

There is no hard copy documentation with this program. There are enough on-screen instructions to satisfy that need. There is no information supplied with the program to indicate what size CoCo is needed.

If you are looking for a simple program to catalog disk files, then this may be the one. But you may be disappointed if you're looking for something that is sophisticated and has lots of features.

Master Disk is a freeware program, so the most you're out is postage if you don't like it.

(Bob's Software, P.O. Box 391, Cleveland, OH 44127, send blank formatted disk and return postage)

— Michael Hunt

One-Liner Contest Winner . . .

Use the 'P' and the '@' keys to maneuver your racer around the course. Upon running the program, enter a number from one to 15 at the L prompt to enter the skill level (level one is most difficult).

The listing:

```
1 PRINTK"KM":INPUT"L";D:K=0:CLS:
PRINT@288,STRING$(192,46);:P=16-
D/2:C=1359:FORB=0TO1:B=0:K=K+1:B
$=INKEY$:PRINT@480+P,"#"STRING$(
D,46)"#":IFPEEK(C)=96THEN1ELSEPO
KEC,42:C=C+(B$="P")-(B$="@"):P=P
+RND(3)-2:P=P-INT(P/(28-D)):D=D+
RND(3)-2:D=D-INT(D/13):NEXT
```

Jeff Noyle
Georgetown, Ontario

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

in the present Color Computer) and challenged the audience to imagine the resolution this would provide.

Steve Bjork is now the OS-9 database section leader on RAINBOW's CoCo SIG on Delphi. Welcome aboard Steve and thanks for the inspiring words.

> ***"Sequential ASCII text files from Disk BASIC load into IBM PC editors without a hitch, although you have to add line feeds after each carriage return when using some editors."***

Amiga, Apple IIe, Atari ST-520, IBM PC, MacIntosh, Robotics and the VME bus were the buzz words at the OS-9 community buffet Sunday morning at RAINBOWfest Chicago. What do all these computers have to do with OS-9? They will all run it soon! That's the word from James W. Moore Jr., the Coordinator of Technical Services at Microware. Bill told about 35 OS-9 aficionados the 68K world has not had an across-the-board operating system and Microware's OSK is the ideal candidate. Why?

"OSK gives you the ability to move software across many different machines," Moore said. "This will be great for software developers."

After mentioning all the new OSK ports, Moore turned the audience's attention to CD-I, noting that the applications we'll use everyday in our homes in 1988 haven't even been dreamed up yet. "The possibilities are staggering," he said.

And, how does this affect the Color Computer OS-9 user? "They'll be way ahead in the game," Moore said. "CoCo OS-9 gives them a gateway to the 68000 software used heavily by industry today. Since the 6809 and 68000 bear such a strong family heritage, it is very easy to port most applications from the 6809 to the 68000. Besides, the 6809 is the best and probably the last 8-bit processor. It is still an important product, but more importantly, it is a mature product. It has a lot of life yet."

Moore predicted as all these new OS-9 ports and systems appear, the programmer with CoCo OS-9 experience will have an edge. Their knowledge is directly applicable. "There is a window of opportunity opening up," he said. "Go for it."

Bill Moore and User Group president Brian Lantz both called 1986 the year that OS-9, an underground classic for several years, hits the light of day. "We have seen a lot of interest from the press and the public in the past several months," Moore said. "Some are even naming OS-9 as a potential competitor to MS-DOS in the 68000 world."

With the world waking up to the wonders of OS-9, it's a shame that only 35 people were able to join Users Group members for the OS-9 Community Buffet. I hope to see you at the OS-9 Buffet during RAINBOWfest Princeton.

Getting the Words on Disk

Many people on the CoCo SIG and at RAINBOWfest Chicago have asked us to recommend a good word processor for use on OS-9. It's a personal choice and it depends on the hardware you are using. However, since problems seem to be popping up with many of the established word processors when they are used with some 80-column cards and Tandy's OS-9 Version 2.00.00, we'll offer a few thoughts.

If you are still using a standard issue CoCo without a hardware 80-column card, here's something you might want to think about. Why not use the *DeskMate* editor? Then, feed your file into the Shareware

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COLOR MIDI CONNECTION — This interface plugs into the cartridge slot. It contains 3 Midi outputs, 1 Midi input, and a female connector for the disk controller (no Y-cable is required) $98.00.

SYNTRAX 1.00 — With this sequencer you will quickly control your Midi system! Major features include: 16 polyphonic tracks, interactive editor, 30,000 bytes for note storage, independent repeats for any track, all midi channel control data (program changes, channel #, velocity, pitch wheel, etc.), int/ext sync for Midi drum machines (or another sequencer), programmable tempo, transposition, clefs, key signatures, chords, complex rhythms, use up to 4 disk drives, sequence chaining and linking, notes/Midi-events can be specified with a resolution of 1/384 note! Requires 64K, disk drive, COLOR MIDI CONNECTION — $75.00.

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because it lets you perform physical input/output operations directly to a disk. Normally, you would be reading or writing to a directory or a file. When you append the commercial "at" sign (@) to a device, you are telling OS-9 that you want to treat the entire disk mounted in the drive as one logical file. And, since Logical Sector Number 0 is the first logical sector on any disk, *patch* looks at it as soon as it is called. Now let's look at the two script files.

Script File Number 1

```
m 0001
05
A0
/
q
```

Script File Number 2

```
m 0001
08
00
40
01
00
/
i 01B4 01FF 00
q
```

The first script file simply positions *patch's* edit pointer to the second byte in the file. The 05 then replaces the 08 and the A0 replaces the 00. The slash (/) tells *patch* you want to exit the edit mode. The 'q' lets you exit from *patch*.

The second script file is used after the RAM disk contains the information from your floppy disk. First, it changes the second and third bytes back to 08 00, or 2,048 sectors. Then, it changes the number of sectors per track, 12 Hex, in the floppy, back to 40 Hex or 64 in the RAM disk and restores the number of bytes in the RAM disk allocation map to 0100.

The two additional changes are needed because when you backup the floppy to the RAM disk, Logical Sector Number 0 from the floppy disk is copied into Logical Sector Number 0 of the RAM disk. If you didn't change it back, OS-9 would think the RAM disk was a 1,440 sector floppy disk.

The next to last line in the second script file restores the last part of the RAM disk's bit map to its original state. In *patch*, the 'i' means initialize. We are initializing, or clearing, each byte between 01B4 and 01FF to 00. Here's why.

The bit sector allocation map begins at 0100 on both the floppy disk and the RAM disk. The bit map from the 1,440 sector floppy disks ends at 01B3. We need to tell OS-9 that all the sectors beginning with sector number 01B4 are free and may be used by other files. We do this by clearing them. The same procedures work with any size floppy disk and any size RAM disk if you change the two script files to match the two disks you are working with.

OS-9 at RAINBOWfest Chicago

Congratulations to Steve Bjork of SRB Software in Simi Valley, California. Steve, who just last February received the "most improved attitude award" from the OS-9 Users Group when he finally started writing programs for OS-9, delivered the keynote address at the CoCo Community Breakfast, and much of his speech was about OS-9. He gave a sneak preview of the new "Model 13" from Tandy complete with slides of the two "Mickey Mouse" processors it reportedly contains. It looked like he shot them on location at Disneyland where he once worked.

Following his short audio-visual presentation, Bjork highlighted the progress the Color Computer has made, spotlighting the new 80-column cards, the Tandy Sound/Speech Cartridge and the Deluxe RS-232 Pak. Asked why he uses the RS-232 cartridge instead of the pseudo serial port on the back of the CoCo, Bjork replied that he doesn't do "bit banging."

He talked about selling computers to people who have never used one. "Some can't even use a hammer!" he said. "We need to make it easier for them to run a computer. I'm no different. When I want to write a letter, I want to write a letter, not write a program to write a letter."

After mentioning the new hardware, Bjork revealed the secret of why Tandy has moved all its software production over to OS-9. "When you add all these devices, you need an operating system. Without OS-9, all you have is Microsoft BASIC. Besides, Microsoft doesn't know how to write an operating system. Just look at MS-DOS," he said, generating a round of laughter from the crowd.

"After much research, Tandy picked up a then relatively obscure operating system named OS-9," Bjork said. "Today they only support three operating systems: MS-DOS, OS-9 and Xenix. They needed an operating system to carry their software in case they changed their machine."

Bjork also praised the OS-9 programming languages, noting that they are almost completely bug free. Few operating systems manufacturers can say that today. Non-experienced users will find it much easier to use the CoCo in the future. He said the OS-9 based *DeskMate* was a step in the right direction, giving beginners a lot of easy-to-use functions at a reasonable price.

He sparked the imagination of the audience when he talked about the new CD-I standard recently introduced by Sony and Phillips. CD-I, which features interactive audio, video and computer data, is driven by a special version of OS-9. To get people thinking, he talked about a "bird book," telling the audience they would be able to give their CD-I based portable computers the location, time of year and a description of the mystery bird they were looking at. The computer could then return the name of the bird. He thought it might be possible to feed the sound of the bird into the computer and match it with the pre-recorded sound of the bird stored on the compact disk.

Bjork called CD-I an appliance computer and said it would give birth to entertainment disks beyond our wildest imagination. As a technical aside, he mentioned that the VDG chip in the CD-I players uses 100K of memory for each picture (compared to 6K

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experiments, you gain a practical tool and a knowledge of another facet of OS-9 at the same time.

This month, the desire to experiment was driven by the fact that I do not own 80-track double-sided drives but do own one of Tony DiStefano's brand new 512K Super RAM cards from CRC Inc. If I used the tricks I published in June with the 512K RAM Disk and double-sided 40-track drives, I would lose nearly 200K of fast RAM disk, not a viable alternative. I wanted to put every byte of the 512K RAM Disk to work.

Finally, one afternoon while plodding along the Mt. Vernon bicycle trail, I had a brainstorm. "Why not format the RAM disk to its full 512K capacity and then go in and change Logical Sector Number 0 to make the backup command think the RAM disk was the same size as the floppy disk. I could then do the backup quickly. After the backup command had finished its job, I could change Logical Sector Number 0 back to its original state and make OS-9 believe the RAM disk was full size. In real life, it wasn't quite that simple, but it worked.

We'll look first at Logical Sector Number 0. At the highest level, OS-9 communicates with many different types of hardware through a hierarchy of file managers, device drivers and device descriptors. An OS-9 module named IOMan, short for Input/Output Manager, manages the flow of information. To do this job, it relies on several subroutine packages designed to communicate with different types or classes of hardware.

The most used of these subroutine packages are SCF, short for Sequential Character Files, and RBF, for Random Block Files. SCF contains a set of routines designed to work with any hardware that sends or receives data sequentially. For example, a terminal sends one character at a time from its keyboard. Likewise, the printer receives one character at a time. SCF manages the flow of these characters to the modem, printer, terminal or any other serial device you have attached to the Color Computer.

However, floppy disks, hard disks and RAM disks behave differently — they send, receive and store information one block at a time. If you were to describe them academically, you would probably call them random-access or block-oriented mass storage devices.

The RBF module is intelligent enough to maintain the logical structure of every file stored on all random access devices. It sends and receives 256 bytes at a time to your hardware by using the proper device driver. However, RBF never needs to deal with the physical details of the read or write operation. The device driver keeps track of things like the physical track and sector address of all data on each disk. RBF only needs to worry about the logical sector number.

The first logical sector on a disk is Logical Sector Number 0. The number of the last logical sector is one less than the total number of sectors available on the disk. The device driver, CCDisk in Color Computer OS-9, translates each logical sector number passed by RBF to the physical track and sector address.

RBF is generic and knows how to communicate with many different storage devices. But before it communicates, RBF must know what type of device it is talking to. To find out, it reads the information stored in Logical Sector Number 0 of the disk mounted in the device. During this read, the driver picks up a lot of information about the physical layout of the disk. Two of the most important details are the number of tracks on the disk and the number of sectors in each track.

This first logical sector is also known as the identification sector. The next logical sector contains the first part of a bit map, or allocation map, that may fill as many as 256 sectors on a large hard disk drive. This bit map tells OS-9 which sectors have already been used to store data and which may be used by additional files. The bit map in the 512K RAM disk we are going to modify just fills Logical Sector Number 1.

Following the bit map, you will find the root directory of the disk. When we modify Logical Sector Number 0 of our RAM disk to make it look like a floppy disk, we are changing the first four bytes in the sector. Later, after we have backed up the floppy disk to the RAM disk, we need to change the first six bytes back to their original state and rewrite part of the bit map. But first let's look at the information stored in Logical Sector Number 0.

During our experiment, we are going to change the value of the total number of sectors on the RAM disk to equal the total number of sectors on our floppy disk. If we look at Logical Sector Number 0 immediately after we format the RAM disk, we find the first three bytes are 00 08 00 Hex or 2,048 decimal sectors. That makes sense since 2,048 * 256 equals 524,288 or 512K. On the other hand, our double-sided, 40-track floppy disk contains 1,440 decimal sectors. If you translate 1,440 to Hex you get 05 A0.

Information Stored	**Offset**	**Name in OS9Defs File**
Number of sectors on disk	00	DD.TOT
Number of sectors on each track	03	DD.TKS
Number of bytes in allocation map	04	DD.MAP
Number of sectors in each cluster	06	DD.BIT
Root directory	08	DD.DIR
Owner's User Number	0B	DD.OWN
Attributes of Disk	0D	DD.ATT
Internal disk ID number	0E	DD.DSK
Number of sides and density	10	DD.FMT
Number of sectors per track	11	DD.SPT
Reserved space	14	DD.RES
First sector in boot file	15	DD.BT
Size of boot file	18	DD.BSZ
Time/date disk created	1A	DD.DAT
Name of Volume	1F	DD.NAM
Path Descriptor Stuff	3F	DD.OPT

So to pull our first trick we must change the 00 08 00 to 00 05 A0. Since the first byte of each value is zero, we need only change the second and third bytes of each three-byte value.

While we are examining Logical Sector Number 0 of our RAM disk, we need to note two other values. We need to know the number of sectors per track and the number of bytes in the allocation map. When we look at the chart, we see that this information is stored at an offset of three and four bytes, respectively, from the beginning of the sector. During our examination, we'll notice that our 512K RAM Disk was formatted with 40 Hex or 64 sectors per track. We'll also see that our RAM disk has 01 00 Hex or 256 bytes in its allocation map. Jot this information down; we'll need it later.

We used the *patch* utility from Computerware's OS-9 Disk Fix and Utilities package to make the changes. Further, we put our input to *patch* in two script files and wrote a short procedure file to do the entire job for us. First, here is the procedure file.

```
load echo
echo Formatting Ram Disk Now
format /r0 >/nil
yDisto Ram Disk
echo Patching Ram Disk Now
patch /R0@ <script1 >/nil
echo Backing Up Disk Now
backup #90 /D0 /R0 >>/nil
yy
echo Restoring Ram Disk Size Now
patch /R0@ <script2 >/Nil
echo Enjoy Your New Super Ram
echo from Tony Distefano and CRC
unlink echo
```

There are a couple of things you should notice in the procedure file above. First, we are patching something called "/R0@." And second, the device descriptor nil. The latter allows you to throw away the output of a program. It comes with Version 2.00.00 of OS-9 from Tandy.

The pathlist above, /R0@, is special

KISSable OS-9

Experimenting with RAM Disks

By Dale L. Puckett
Rainbow Contributing Editor

Progress has been plodding along at a snail's pace here at KISSable OS-9 headquarters. Our original $499, 4K, 1979 "Model D" CoCo finally bit the dust and we were forced to lay out $69 to replace it with a 16K CoCo 2. The 16K status didn't last long, however; about an hour after we picked it up, MOTD Editor Bruce Warner and I had installed 64K memory chips. I needed to get online fast because I was falling behind in the testing of all the new equipment/software now available to CoCo OS-9 aficionados.

One of the most exciting opportunities came from Fran McGee at Tandy who loaned us a 15-megabyte hard disk to use for a month or two. Next month, we hope to present an action-packed chronology of our adventures. This month, we follow up on the RAM disk experiments we presented in the June issue. We'll show you another trick that lets you do backups from a floppy and still use all the available space on the RAM disk.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Official Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale works as a U.S. Coast Guard chief warrant officer and lives in Alexandria, Virginia.*

We'll be telling you about some of the information stored in Logical Sector Number 0 on all OS-9 disks. We'll also look at a CoCo/IBM data transfer utility package and feature a UNIX-like stat routine written in assembler for OS-9, a BASIC09 pretty printing program and a C program that adds a header to the standard *line.c* utility.

First however, we must pass along an addendum and a correction. Tom Roginski of Owl-Ware, P.O. Box 116-D, Mertztown, PA 19539, 800-245-6228, contacted us about the *Winchester* BASIC we described in the June issue. Al Reinhart, the program's author, sent us the information earlier this year. He called the program WBASIC. The proper name for the program is *Winchester* BASIC and you can buy it from Owl-Ware. The price is $50 when you buy an Owl-Ware hard disk drive — $75 when you buy it alone. We try to include the name and address of the vendor when we describe a program, but this one slipped through the cracks.

Turning to corrections, in May we gave you a really slick shortcut to use when you need to OS9Gen a new disk. Unfortunately, my fingers weren't listening to my mind and I typed the wrong command line. The command line should have read, `ls ! os9gen /D1` <ENTER>. To use this tip, create a new directory. Then, copy or save the modules you want in the new OS-9 boot file into this new directory. Finally, use the CHD utility command to make the new directory, the current data directory and type the command line above. Of course, you must have a freshly formatted disk loaded in Drive/D1 when you execute this command.

After developing and testing the procedures needed for this month's RAM disk experiments, I was surprised to receive a message from Dennis Skala on RAINBOW's Delphi CoCo SIG. He had taken a similar approach with his RAM disk.

"I read your June column with interest, especially the handstands you were doing while trying to get a floppy disk quickly copied to a RAM disk without losing a large chunk of the RAM disk's capacity. I went through a similar process when I first started using my RAM disk," Dennis said.

"I didn't think of formatting the floppies in a non-standard way. Rather, I rewrote the backup utility and removed the requirement that the drives have the same number of sectors. This means I can copy any type of disk to the RAM disk — single- or double-sided, 40- or 80-track. I wrote the new backup command so that the balance of the RAM disk in excess of the floppy's capacity remains free," Skala said. "I also picked up a bonus — I can now quickly backup a standard Radio Shack 35-track disk to one of my 40-track drives." You'll be happy to know that Skala has uploaded his new backup command to the OS-9 database section of RAINBOW's CoCo SIG on Delphi and it is available there for you to download.

One of the main reasons we publish these little experiments is to provide a practical project to share some of the details that make a complex operating system like OS-9 powerful. When you duplicate one of these

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changes, subscripting and superscripting. For example, you could call for extended letters to type a title or heading and return to normal type for the body of text.

Print formatting commands change format settings in *PenPal* itself like margins, page lengths, line spacing, centering of text, right justification, page numbering options, form feed (new page) and wait after each page is printed. The only thing missing is page headers. These formatting commands permit changes to be made in the middle of the text. For example, you could change the left margin to indent a quotation or a list. When the quotation is entered, a formatting command is included to reestablish the original margin for the following text. If you don't like the default settings for the basic document, lead off with print formatting commands at the beginning of the document. Justification and page numbering choices would certainly be made there.

Write has a few limits. You cannot print out a book manuscript by queuing files as with *Telewriter* and *DynaForm*. It does not do mail merge. It lacks headers, footers and footnoting capability. But, most users will never miss these.

A final consideration is the way *PenPal* saves the text buffer. Like *DeskMate* and a bunch of non-CoCo programs, paragraphs are written into the buffer without delineation of lines within the paragraph. A carriage return character ends the paragraph.

The file on disk is in ASCII format, but apparently lacks the end-of-file designation BASIC expects. To read a file into a BASIC program, two things must be done. First, carriage returns must be inserted into long paragraphs to break them into segments short enough to fit into a BASIC string variable. This must be done by editing the file in *PenPal* and inserting carriage returns at the end of every second or third line on the screen. *PenPal* shows you where there are carriage returns in the document. Next, the file must be run through a BASIC program to save the text to a new disk file that handles the end-of-file properly. The following is an example of a program to do this.

```
4 CLEAR10000
5 CLS:PRINT:INPUT"DRIVE # INPUT
FILE";ID$:PRINT:ID=VAL(ID$):DIRI
D:PRINT:INPUT"INPUT FILE NAME";F
I$:IP$=FI$+":"+ID$
10 OPEN"I",#1,IP$
12 PRINT:INPUT"DRIVE # OUTPUT
FILE ";OD$:PRINT:OD=VAL(OD$):DIR
OD:PRINT:INPUT"OUTPUT FILE
NAME";FO$:OP$=FO$+":"+OD$
15 OPEN"O",#2,OP$
20 IFEOF(1)THEN CLOSE:END ELSE L
INEINPUT#1,A$
30 PRINTA$:PRINT#2,A$
40 GOTO20
```

The program simply opens an input and an output file as defined by the user. The directory for each drive used is displayed as a convenience. Strings are read in with `LINEINPUT#1,A$` and printed both to the screen, so one sees some action, and to the second file. One would expect EOF(1) in Line 20 to detect the end of file and close both files. Since a proper end of file is lacking, the program ends with an IE Error which causes BASIC to close the files anyway. The output file will be a proper ASCII file that will load into a BASIC program or into *Telewriter*.

Though I am typing this in *PenPal*'s Write, I will transport it to *Telewriter* for printing because I want headers on each page.

From this examination of the Write module, you can get the flavor of the rest of *PenPal*. The Calc, Database and Telecom modules each combine much more than minimum functionality coupled with some unique features. Each are easy to learn and use. Some operations like the screen update in the Write module and the recalculation in Calc are unusually fast while none seem especially slow. All are function key driven with a function key strip displayed or, in Graphit, displayable.

My overall impression was good at RAINBOWfest, and a full day with the package has reinforced that. The only problem that might be significant is in the file saving operation on a JDOS-formatted, 40-track disk. It seems to be wasting disk granules. Fewer granules are reported to be available than should be for the number reported used. For example, if I add up the granules used by the files on a 40-track disk, I find 19 of 78 granules used, but only 45 free. Fourteen granules have been lost somewhere. This problem appears to be associated with a 40-track disk formatted with JDOS since disk space all adds up on a 35-track disk formatted by Disk BASIC.

Next month I will discuss the other modules.

PenPal is available from Four Star Software, Box 730, Streetsville P. O., Mississauga, Ontario, Canada, L5M 2C2. Price is $89.95 U.S. Canadian price is $119.95. The program is also available from some U.S. dealers so check RAINBOW advertisements.

name); F3, Free; F4, Kill; and F5, Dir, are identical to Disk BASIC functions. The real fun begins with F6, Step, which changes the stepping rate of the disk drives and F8, Trks, which allows selection of 35- or 40-track drives. You need another DOS like ADOS, CDOS or JDOS to format disks to 40-tracks.

I ran into problems when I tried to set up a 40-track disk. I used JDOS to format a disk with 40 tracks and backup the *PenPal* program disk to it. I ended up with a 35-track disk probably because the file allocation table copied is for 35 tracks. Next I formatted another disk for 40 tracks and used JDOS to copy a number of files across. Part of each file was lost. Next I formatted a 40-track disk and placed it in Drive 1. I booted *PenPal* and checked available sectors on Drive 1. Free reported 73 granules rather than 78. I was able to load files into *PenPal* from the 35-track data disk and save them onto the "40-track" disk, but never recovered the five lost granules. More on JDOS 40-track format problems later.

Finally, from the Main Menu, F7 saves all current settings to a Config file. This way, when you boot *PenPal*, Drive 1 can automatically be the default drive. All current printer defaults are set as well.

As I mentioned before, the files pertaining to a particular application are listed under its name on the main menu. The extensions clue *PenPal* on what belongs where. For example, all files saved from Write and saved as ASCII files from other applications carry a WP extension. Move the cursor over a blank entry under the application to start a new file or over an existing file name to start editing. If a new file is chosen, you are asked for a filename.

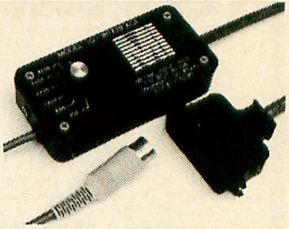
Write is the word processor. One of the first things I noticed was the 32,510 byte text buffer. This holds a lot of text. Any article in this RAINBOW would fit. This compares with about a 12K buffer in *DeskMate*.

PenPal is much like *DeskMate* in cursor movement and editing methods. It supports block commands to delete, copy and move text. It also supports buried printer control commands with the ability to tailor these commands to your printer and save these codes to the Config file using F7 from the main menu. Nine commands are available, each with a toggle on and a toggle off form. While six come predefined for RS-DMP printers, you can change these for your printer. These are needed to provide for underlining, font

Metric Industries

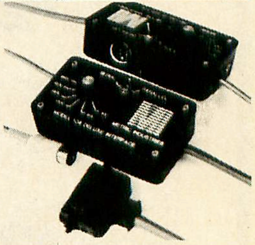
Model 101 Interface $39.95

The Model 101 is a serial to parallel interface intended for use with a COCO and any Centronics compatible parallel input printer. The 101 has 6 switch selectable baud rates (300-9600). The 101 is only 4" × 2" × 1" and comes with all cables and connectors for your computer and printer.



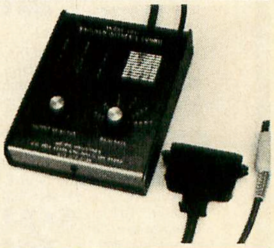
The Model 104 Deluxe Interface $51.95

The Model 104 is a serial to parallel interface like the Model 101 but it has the added feature of a serial port (sometimes referred to as a modem switch). This feature allows the connection of a parallel printer and any serial device (modem, serial printer etc.) to your computer. You may then select either output, serial or parallel, with the flip of a switch. The 104 is only 4.5" × 2.5" × 1.25" and comes with all cables and connectors for your computer. You supply the serial cable for your modem or other serial device.



Model 103 Combo $68.95

With the turn of a knob the model 103 switches your computer's RS232C serial port to any one of 3 outputs — 2 serial and 1 parallel. The serial ports may be used for modems, serial printers or even another computer. The parallel port can be used with any Centronics compatible printer. The 103 has the best features from the 101 and 102: color coded position indicator lights, 6 switch selectable baud rates, heavy anodized aluminum cabinet, and many more.



Model 102 Switcher $35.95

The Model 102 has 3 switch positions that allow you to switch your computer's serial output between 3 different devices (modem, printers or another computer). The 102 has color coded lights that indicate the switch position. These lights also act as power indicators to let you know your computer is on. Supplied with the 102 are color coded labels that can be applied to your accessories. The 102 has a heavy guage anodized aluminum cabinet with non-slip rubber feet.

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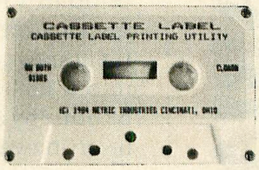
New Version 1.2-Tape transferrable to disk. Now save and load Labels from tape or disk.

This fancy printing utility prints 5 lines of information on pinfeed cassette labels. "Cassette Label" is menu driven and is very easy to use. It uses the special features of your printer for standard, expanded or condensed characters. Each line of text is automatically centered. Before the label is printed, it is shown on your CRT — enabling you to make changes if you like — then print 1, 2 or 100 labels. The program comes on tape and it is supplied with 24 labels to get you started. 16K ECB required.



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ACCESSIBLE APPLICATIONS

Getting in Touch with *Pen Pal*

By Richard A. White
Rainbow Contributing Editor

Many people I spoke with at the Chicago RAINBOWfest are very satisfied with *DeskMate*, considering it is a beginner's level program. But, the folks at Four Star Software aren't satisfied since they are selling *PenPal* to do the same things. James Norrie of Four Star gave me a demonstration and ended up selling a copy to me. The last thing I need is another program to do word processing, spreadsheets, databases, graphing and telecommunications. However, *PenPal* looked so good, I felt I had to give it a real workout and let you know what I found. *PenPal* requires a 64K CoCo with one disk drive. Two drives are better.

There needs to be two sets of standards when judging software of this type. One is the power and usefulness of the individual modules and the other is the value of the total package to the average user who doesn't want or need most of the bells and whistles in the more powerful, single-application packages. Let's look at each application in *PenPal*, then make a judgment on the whole and look at the pieces more critically.

All applications use a common 51-character by 24-line screen in the high resolution graphics mode. Screen update is the fastest I have seen on the CoCo. One problem I have with *Telewriter* is that characters are lost when the wordwrap scrolls the screen and starts a new line. This has not happened on *PenPal*. The whole screen seems to move up one line as a unit and the word being wordwrapped goes to the left margin.

The top line of the screen displays a command line in reverse video. This is where things like the module name and current filename are displayed. The bottom two lines display a function key strip, again in reverse video. Up to 10 functions are displayed which are called by pressing the CLEAR key and a number together. Some applications have more than 10 functions in which case the F0 (CLEAR-'0') toggles the display of the alternate function key strip. Only those functions currently displayed by the function key strip can be called, but the alternate strip is easily toggled into view.

The five alternate functions are called by pressing SHIFT, CLEAR and the number key together. AF1 invokes a simple calculator that uses the command line at the top of the screen and does not interfere with the display for the application you are in. AF2 allows the user to change the printer defaults such as margins, page lengths, Baud rate and the like. The defaults are displayed one at a time in the command line at the top of the screen and pressing ENTER leaves the setting unchanged and moves to the next. This is much faster than loading graphics configuration screens and saving them as *DeskMate* does. You have the option of saving the new defaults from the main menu. In addition, the defaults are maintained as you move from application to application during a session.

AF3 toggles the screen background color between green and buff. AF4 calls the help file appropriate for the application and AF5 produces a directory of the default drive. AF12 exits an application without saving the file. What is key 12? It's the minus sign. CLEAR and the minus key (F12) will exit any function, application, or the program from the main menu.

When you `LOADM` *PenPal* and type `EXEC`, you see the main menu. It presents a five-part table headed by the application name with the names of the files listed below. The function key strip displays disk file functions. F1, Swap, changes the default drive. F2, Name(Re-

---

Richard White lives in Fairfield, Ohio, and has a long background with microcomputers and specializes in BASIC *programming. With Don Dollberg, he is the co-author of the* TIMS *database management program.*

Listing 3: CHARGEN

```
300 ......234
500 ......181
END .......1
```

```
100 'CHARACTER GENERATOR TEST PR
OGRAM
110 CLEAR 100,&H3FFF
120 POKE &H413C,&H42
130 POKE &H413D,&H00
140 FOR I=&H4200+65*8 TO &H4200+
65*8+26*8-1
150 READ A: POKE I,A
160 NEXT I
170 FOR I=&H4200+32*8 TO &H4200+
32*8+7
180 POKE I,0
190 NEXT I
200 LOADM"CHARGEN",&H4000
210 DEFUSR0=&H4000
220 PMODE 4,1
230 SCREEN 1,0
240 PCLS
250 A$=CHR$(0)+CHR$(0)+CHR$(1)+"
TANDY"
260 B=VARPTR(A$)
270 A=USR0(B)
280 C$=CHR$(50)+CHR$(50)+CHR$(2)
+"COLOR COMPUTER"
290 B=VARPTR(C$)
300 A=USR0(B)
310 D$=CHR$(40)+CHR$(100)+CHR$(6
)+"SUPER"
320 B=VARPTR(D$)
330 A=USR0(B)
340 GOTO 340
350 DATA 16,40,68,68,124,68,68,0
360 DATA 120,36,36,56,36,36,120,
0
370 DATA 56,68,64,64,64,68,56,0
380 DATA 120,36,36,36,36,36,120,
0
390 DATA 124,64,64,120,64,64,124
,0
400 DATA 124,64,64,102,64,64,64,
0
410 DATA 60,64,64,76,68,68,60,0
420 DATA 68,68,68,124,68,68,68,0
430 DATA 56,16,16,16,16,16,56,0
440 DATA 4,4,4,4,4,68,56,0
450 DATA 68,72,80,96,80,72,68,0
460 DATA 64,64,64,64,64,64,124,0
470 DATA 68,108,84,84,68,68,68,0
480 DATA 68,100,84,76,68,68,68,0
490 DATA 56,68,68,68,68,68,56,0
500 DATA 120,68,68,120,64,64,64,
0
510 DATA 56,68,68,68,84,72,52,0
520 DATA 120,68,68,120,80,72,68,
0
530 DATA 56,68,64,56,4,68,56,0
540 DATA 124,16,16,16,16,16,16,0
550 DATA 68,68,68,68,68,68,56,0
560 DATA 68,68,68,40,40,16,16,0
570 DATA 68,68,68,68,84,108,68,0
580 DATA 68,68,40,16,40,68,68,0
590 DATA 68,68,40,16,16,16,16,0
600 DATA 16,56,84,16,16,0,0,0
```

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whether that pattern is a character or some other symbol.

Next month we'll be back with more CoCo assembly language topics. In the meantime, use those PCRs and move around a little! ☐

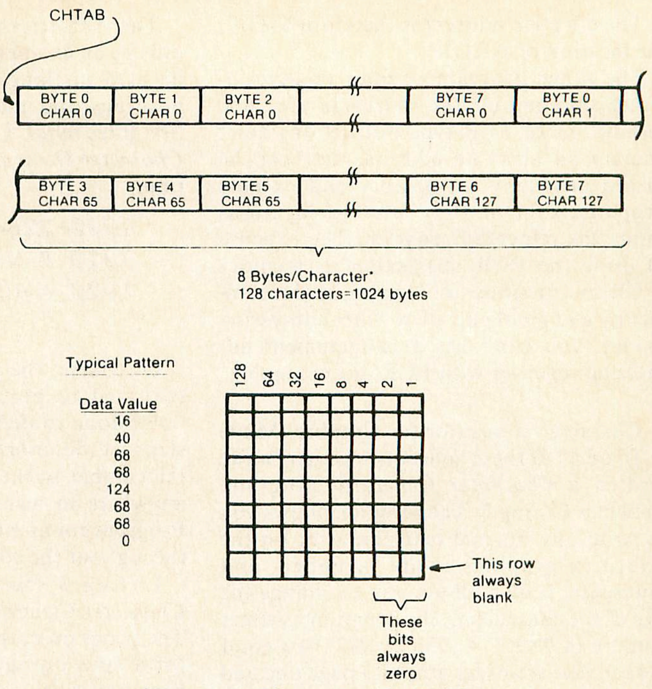

Figure 6: Character Definition

Listing 1:

```
                00100 *MOVE CHARACTER SUBROUTINE
3E00            00110         ORG     $3E00
3E00            00120 CHAR    RMB     1       RESERVE FOR CHARACTER CODE
3E01            00130 SPEED   RMB     1       RESERVE FOR SPEED
3E02 B6    3E00 00140 START   LDA     CHAR    GET CHARACTER
3E05 F6    3E01 00150         LDB     SPEED   GET SPEED
```

Listing 2:

```
                 00100 *==========================================
                 00110 * WRITE TEXT ON GRAPHICS SCREEN PROGRAM
                 00120 * INPUT: INPUT ARGUMENT POINTS TO STRING PAR BLK
                 00130 *        A$=CHR$(X)+CHR$(Y)+CHR$(SF)+"TEXT..."
                 00140 * OUTPUT:OUTPUT ARGUMENT CONTAINS NEXT X,Y
                 00150 *==========================================
0000 BD   B3ED   00160 WTEXT   JSR     $B3ED   CONVERT POINTER TO SPB
0003 1F   01     00170         TFR     D,X     NOW IN X
0005 A6   84     00180         LDA     ,X      GET LENGTH OF STRING
0007 80   03     00190         SUBA    #3      ADJUST FOR X,Y,SF
0009 25   3A     00200         BLO     WTE020  GO IF NULL STRING
000B A7   8D 011D 00210        STA     CCNT,PCR STORE FOR LOOP CONTROL
000F AE   02     00220         LDX     +2,X    GET STRING ADDRESS
0011 EC   84     00230         LDD     ,X      GET XY
0013 ED   8D 011A 00240        STD     XX,PCR  STORE
0017 A6   02     00250         LDA     +2,X    GET SF
0019 A7   8D 0116 00260        STA     SF,PCR  SAVE SCALE FACTOR
001D 30   03     00270         LEAX    +3,X    BUMP PAST SF
001F AF   8D 010A 00280        STX     TEXT,PCR STORE AS POINTER
                 00290 *MAIN LOOP HERE
0023 A6   9D 0106 00300 WTE010 LDA     [TEXT,PCR] GET NEXT CHARACTER
0027 C6   08     00310         LDB     #8         8 BYTES PER CHARACTER
0029 3D          00320         MUL                FIND OFFSET FROM START
002A E3   8D 010E 00330        ADDD    CHTAB,PCR  NOW POINTS TO CHAR
002E ED   8D 00FD 00340        STD     CHAR,PCR   STORE FOR OUTPUT
0032 8D   19     00350         BSR     WRITEC     WRITE THIS CHARACTER
0034 EC   8D 00F5 00360        LDD     TEXT,PCR   GET TEXT POINTER
0038 C3   0001   00370         ADDD    #1         BUMP TEXT POINTER
003B ED   8D 00EE 00380        STD     TEXT,PCR   STORE FOR NEXT ACCESS
003F 6A   8D 00E9 00390        DEC     CCNT,PCR   DECREMENT COUNT
0043 26   DE     00400         BNE     WTE010     GO IF MORE CHARS
                 00410 *NO MORE CHARACTERS HERE
0045 EC   8D 00E8 00420 WTE020 LDD     XX,PCR  GET CURRENT X,Y
0049 BD   B4F4   00430         JSR     $B4F4   CONVERT BACK FOR OUTPUT
004C 39          00440         RTS             RETURN
                 00450 *==========================================
                 00460 *WRITE A CHARACTER SUBROUTINE
004D A6   8D 00E1 00470 WRITEC LDA     YY,PCR  GET CURRENT Y
0051 34   02     00480         PSHS    A       SAVE FOR RETURN
0053 86   08     00490         LDA     #8      8 ROWS PER CHARACTER
0055 A7   8D 00DB 00500        STA     WCNT,PCR SAVE FOR COUNT
                 00510 *MAIN LOOP HERE
0059 A6   8D 00D6 00520 WRI010 LDA     SF,PCR     GET SCALE FACTOR
005D A7   8D 00D4 00530        STA     WORK1,PCR  SAVE FOR SET ROW SR
                 00540 *INNER LOOP HERE
0061 A6   9D 00CA 00550 WRI020 LDA     [CHAR,PCR]   GET ROW BIT PATTERN
0065 A7   8D 00CD 00560        STA     ROW,PCR      SAVE
0069 8D   31     00570         BSR     SETROW       WRITE A ROW
006B 6C   8D 00C3 00580        INC     YY,PCR       BUMP Y POINTER
006F 6A   8D 00C2 00590        DEC     WORK1,PCR    DECREMENT SF COUNT
0073 26   EC     00600         BNE     WRI020       GO IF MORE EXPANSION
0075 EC   8D 00B6 00610        LDD     CHAR,PCR   GET ROW PATTERN PTR
0079 C3   0001   00620         ADDD    #1         BUMP ROW PATTERN PTR
007C ED   8D 00AF 00630        STD     CHAR,PCR   SAVE FOR NEXT ROW
0080 6A   8D 00B0 00640        DEC     WCNT,PCR   DECREMENT ROW COUNT
0084 26   D3     00650         BNE     WRI010     GO IF NOT 12
                 00660 *WRITTEN 8 ROWS HERE
0086 A6   8D 00A9 00670        LDA     SF,PCR  GET SCALE FACTOR
008A C6   06     00680         LDB     #6      6 BITS PER ROW
008C 3D          00690         MUL             COMPUTE X EXPANSION
008D EB   8D 00A0 00700        ADDB    XX,PCR  ADJUST X
0091 E7   8D 009C 00710        STB     XX,PCR  POINT TO NEXT CHAR POS
0095 35   02     00720         PULS    A       GET ORIGINAL Y
0097 A7   8D 0097 00730        STA     YY,PCR  RESTORE Y
009B 39          00740         RTS             RETURN
                 00750 *==========================================
                 00760 *SET A ROW SUBROUTINE
009C A6   8D 0091 00770 SETROW LDA     XX,PCR  GET CURRENT X
00A0 34   02     00780         PSHS    A       SAVE FOR RETURN
00A2 86   06     00790         LDA     #6      6 COLUMNS/ROW
00A4 A7   8D 008F 00800        STA     COCNT,PCR SAVE FOR LOOP CONTROL
                 00810 *MAIN LOOP HERE
00A8 A6   8D 0087 00820 SET010 LDA     SF,PCR      GET SCALE FACTOR
00AC A7   8D 0088 00830        STA     WORK2,PCR   SAVE FOR EXPANSION OF X
                 00840 *INNER LOOP HERE
00B0 6F   8D 0085 00850 SET020 CLR     BIT,PCR       SET BIT TO 0
00B4 A6   8D 007E 00860        LDA     ROW,PCR       GET REMAINING PATTERN
00B8 2A   04     00870         BPL     SET030        GO IF 0
00BA 6C   8D 007B 00880        INC     BIT,PCR       SET BIT TO 1
00BE 8D   1B     00890 SET030  BSR     PSET          SET ONE BIT
00C0 6C   8D 006D 00900        INC     XX,PCR        BUMP X POSITION
00C4 6A   8D 0070 00910        DEC     WORK2,PCR     DECREMENT SCALE FAC
00C8 26   E6     00920         BNE     SET020        GO IF MORE X BITS
00CA 68   8D 0068 00930        LSL     ROW,PCR     SHIFT BIT PATTERN LEFT
00CE 6A   8D 0065 00940        DEC     COCNT,PCR   DECREMENT COLUMN COUNT
00D2 26   D4     00950         BNE     SET010      GO IF MORE COLUMNS
                 00960 *ONE ROW DONE HERE
00D4 35   02     00970         PULS    A       RESTORE X
00D6 A7   8D 0057 00980        STA     XX,PCR  FOR NEXT ROW
00DA 39          00990         RTS             RETURN
                 01000 *==========================================
                 01010 *PSET OR PRESET SUBROUTINE
00DB E6   8D 0053 01020 PSET   LDB     YY,PCR  GET CURRENT Y
00DF 86   20     01030         LDA     #32     32 BYTES PER ROW
00E1 3D          01040         MUL             FIND BYTE OFFSET
00E2 C3   0E00   01050         ADDD    #$E00   NOW POINTS TO BYTE ROW
00E5 ED   8D 0051 01060        STD     LOC,PCR SAVE FOR ACCESS OF BYTE
00E9 E6   8D 0044 01070        LDB     XX,PCR  CURRENT X
00ED 86   20     01080         LDA     #32     THIS IS DIVIDE BY 8
00EF 3D          01090         MUL             QUOTIENT IN A
00F0 1F   89     01100         TFR     A,B     Q NOW IN B
00F2 4F          01110         CLRA            Q NOW IN D
00F3 E3   8D 0043 01120        ADDD    LOC,PCR NOW POINTS TO ACTUAL BYTE
00F7 ED   8D 003F 01130        STD     LOC,PCR STORE FOR ACCESS
00FB 1083 2600   01140         CMPD    #$E00+6144 TEST FOR OUT OF PAGE
00FF 24   2A     01150         BHS     PSET99  DO NOTHING IF OUT
0101 1083 0E00   01160         CMPD    #$E00   TEST FOR OUT OF PAGE
0105 25   24     01170         BLO     PSET99  DO NOTHING IF OUT
0107 E6   8D 0026 01180        LDB     XX,PCR  GET CURRENT X
010B C4   07     01190         ANDB    #7      GET BIT POSITION
010D 86   80     01200         LDA     #128    MS BIT FOR MASK
010F 5D          01210 PSET10  TSTB               TEST BIT COUNT
0110 27   04     01220         BEQ     PSET15     GO IF FOUND
0112 44          01230         LSRA               SHIFT MASK
0113 5A          01240         DECB               DECREMENT COUNT
0114 20   F9     01250         BRA     PSET10     CONTINUE SHIFTING
0116 6D   8D 001F 01260 PSET15 TST     BIT,PCR TEST BIT FOR 0 OR 1
011A 26   07     01270         BNE     PSET20  GO IF 1
011C 43          01280         COMA            COMPLEMENT MASK
011D A4   9D 0019 01290        ANDA    [LOC,PCR] RESET THE BIT
0121 20   04     01300         BRA     PSET25  GO TO STORE
0123 AA   9D 0013 01310 PSET20 ORA     [LOC,PCR] SET BIT
0127 A7   9D 000F 01320 PSET25 STA     [LOC,PCR] STORE BYTE WITH BIT
012B 39          01330 PSET99  RTS             RETURN
                 01340 *==========================================
                 01350 *WORKING VARIABLES - COULD BE STACK, BUT ...
012C             01360 CCNT    RMB     1       # OF CHARACTERS TO DISPLAY
012D             01370 TEXT    RMB     2       POINTER TO BASIC TEXT
012F             01380 CHAR    RMB     2       POINTER TO CURRENT CHAR PAT
0131      FF     01390 XX      FCB     -1      CURRENT X
0132      FF     01400 YY      FCB     -1      CURRENT Y
0133             01410 SF      RMB     1       SCALE FACTOR
0134             01420 WCNT    RMB     1       # OF ROW COUNTER
0135             01430 WORK1   RMB     1       WORKING
0136             01440 ROW     RMB     1       CURRENT ROW BITS
0137             01450 COCNT   RMB     1       CURRENT COL COUNT
0138             01460 WORK2   RMB     1       WORKING
0139             01470 BIT     RMB     1       CURRENT BIT
013A             01480 LOC     RMB     2       BYTE CONTAINING BIT
                 01490 *==========================================
                 01500 *CHARACTER PATTERN TABLE. 8 ROWS/CHARACTER
                 01510 *FOR 128 CHARACTERS-1024 BYTES.
013C             01520 CHTAB   RMB     2
          0000   01530         END

00000 TOTAL ERRORS
```

The effective address is therefore $3E0C, the location of ARG1.

The other program counter relative instructions compute the address in the same fashion. Since PCR-type instructions don't contain an absolute address, they can be placed anywhere in memory and execute properly, even if they refer to locations inside the relocated program. The expense of using the PCR instructions is memory (PCR instructions are longer), more complexity and giving up a few other addressing modes (you can't use auto-increment addressing together with PCR, for example).

A Character Generator for Graphics Mode

To tie all of these concepts together, we've written a *Character Generator* program, shown in Listing 2. The program allows you to write any normal text character on the screen in graphics mode in upper- and lowercase. It also allows you to change the size of the characters. The program assumes you are in `PMODE 4` (256 by 192, two-color mode), you are using graphics page one and you have a disk system.

The input parameters to the system take the form of a BASIC string. The first character of this string is the 'X' position representing the upper left-hand corner of the first character. The second character of the string is the corresponding 'Y' position. The third character is the size of the characters to be written on the screen, from one to 16. The remainder of the string is the text to be written. As an example, suppose that you wanted to write "This is a test" in the center of the screen. The height of text for a text screen is 12 pixels high and the width is eight pixels. However, character positions for this program are eight pixels high by eight pixels wide to allow packing 24 lines on the screen. The center of the screen is at X=128, Y=96. The input string looks like this:

```
ZZ$=CHR$(128)+CHR$(96)+CHR$(1)+"THIS IS A TEST"
```

The screen output looks like Figure 4.

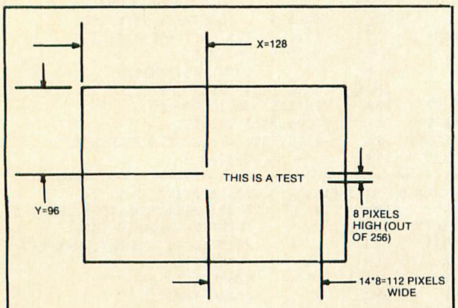

Figure 4:
Sample Character Generator Output

To change the size of the text, use another value in the third byte. This byte represents the magnification factor. To display characters 24 pixels high you'd have:

```
ZZ$=CHR$(124)+CHR$(90)+CHR$(3)+"This is larger text"
```

The ZZ$ string variable string was used only as an example. Any string variable can be used, as long as it has the 'X' and 'Y' positions and magnification factor in the first three bytes. The sequence for calling the *Character Generator* uses the `VARPTR` function:

```
1000 ZZ$=...
1010 B=VARPTR(ZZ$)
1020 A=USR(B)
```

Of course, the program must have been relocated to protected memory and a `DEFUSR` done to define the start — all of the steps we described earlier. The program is relocatable, by the way, so that it can be used anywhere in memory you want to put it. Program counter relative addressing is used throughout the code.

Listing 3 shows a typical use of the *Character Generator* in writing sample text. The program must be on the disk in binary form (the output of an assembler). The program is relocatable and may be moved anywhere in RAM, but allow 318 bytes for the program. Change `DEFUSR0` accordingly. The resulting display for this test driver is shown in Figure 5.

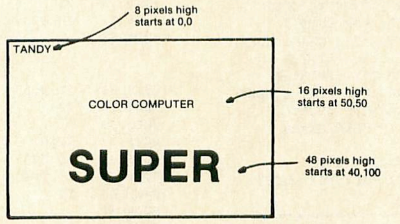
8 pixels high starts at 0,0
TANDY
COLOR COMPUTER
16 pixels high starts at 50,50
SUPER
48 pixels high starts at 40,100

Figure 5: Test Driver Display

The program uses a 1,024-byte character pattern area called CHTAB, or Character Table. The address of this table must be `POKE`d into locations $13C and $13D as shown in Listing 3. The Character Table can be directly after the *Character Generator* program, or may be anywhere else in memory. The first eight bytes in this table represent the pattern for an ASCII character of zero, the next eight bytes the pattern for an ASCII character of one, the 65th set of eight bytes represent the pattern for 'A', and so forth. You can fill in your own characters for ASCII codes not normally used in the Color Computer, such as codes zero through 31. Each set of eight bytes represents the eight rows that make up a character, as shown in Figure 6.

The BASIC test program shows the patterns for the uppercase alphabetic characters A through Z and for a space character. Fill in the remaining characters as the need arises. All 128 positions in the table can be used, and any symbols meaningful to you can be used. Don't forget that the "scale factor" allows an expansion of each pattern,

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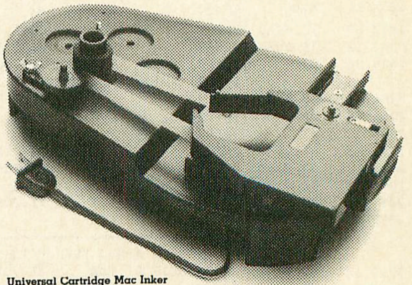

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Assembly language:

```
START      JSR  $B3ED
           TFR  D,X          point to block
           LDA  ,X           get 45
           LDB  1,X          get 233, etc.
           .
           .
```

Is this really better than just assigning a block of protected memory for the parameter block? Probably not, but it is an alternative method.

VARPTR is handy, though, when working with strings. If VARPTR is used to find the location of a string, it returns not the address of the string, but the address of a five-byte string parameter block as shown in Figure 3. The third and fourth bytes of this parameter block (+2 and +3) point to the location of the string itself. If this string address is used in the assembly language subroutine, it must again be converted to an integer value in D by a JSR $B3ED as shown here:

BASIC:

```
100 A$="COLOR COMPUTER"
110 B=VARPTR(A$)
120 DEFUSR0=&H3E00
130 A=USR0(B)
      .
      .
      .
```

Assembly language:

```
START    JSR    $B3ED          convert to integer address
         TFR    D,X            X now points to string
```

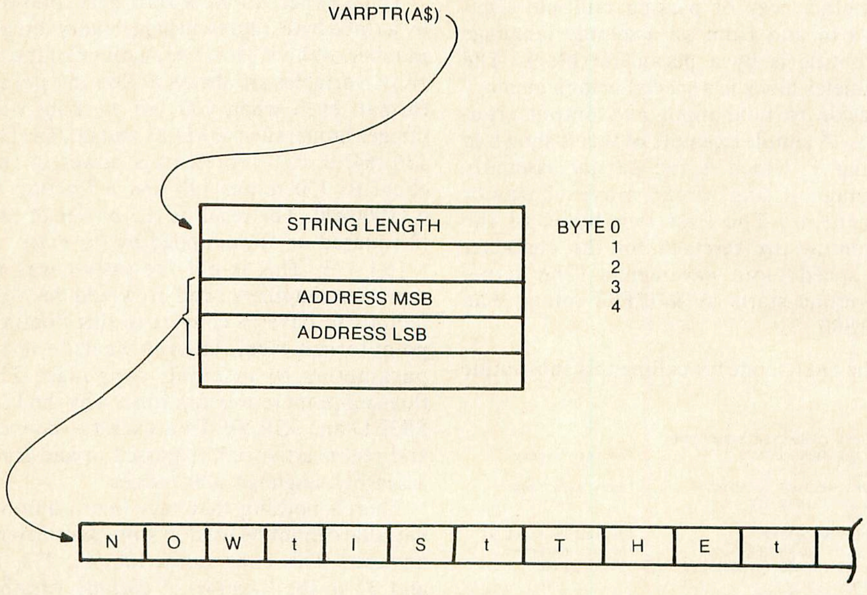

Figure 3: String Parameter Block

Relocatability

In our examples and in last month's column, we assumed for the most part the machine language code generated and stored in DATA statements started at a fixed location — &H3E00 in our examples. A typical assembly language program can't be stored and executed just anywhere in memory. Let's see why.

Suppose we had a program that referenced a parameter block at the beginning of the program area, something like this:

```
3E00      00    00100   XPOS   FCB   0      for x position
3E01      00    00110   YPOS   FCB   0      for y position
3E02 B6 3E00    00120   START  LDA   XPOS   get X position
3E05 F6 3E01    00130          LDB   YPOS   get Y position
```

You can see that the LDA and LDB assembled as "extended" addressing types of instructions. Each instruction consists of a one-byte operation code ($B6 and $F6) followed by a two-byte address ($3E00 and $3E01). What would happen if this code were incorporated into DATA statements and then moved to the $4000 area? The result would look like this:

```
4000      00    00100   XPOS   FCB  0        for x position
4001      00    00110   YPOS   FCB  0        for y position
4002 B6 3E00    00120   START  LDA  $3E00    get X position
4005 F6 3E01    00130          LDB  $3E01.   get Y position
```

Although the locations in which the instructions were stored changed, the references were still to $3E00 and $3E01. Obviously, when this program was executed, A was loaded with the contents of location $3E00 and B with the contents of location $3E01 instead of the new locations at the beginning of the program, $4000 and $4001.

This problem occurs for all references to data locations inside the program, but not to external fixed areas. If there were a parameter block at memory area $5000, for example, an LDA $5000 would be valid wherever the program was moved. The same thing applies to system memory areas like the text or graphics screens — they are at fixed locations.

The problem also applies to JMP and JSR instructions, which jump to locations specified by absolute addresses within the instruction, generated at assembly time. Branches, however, use relative addressing in which the effective address for the branc is computed by adding the contents of tl program counter to a displacement valu within the instruction. Look at this prc gram:

```
3E00               00100           ORG    $3E0
3E00 7E 3E05       00110 FIRST     JMP    NEXT
3E03    00         00120           FCB    0
3E04    00         00130           FCB    0
3E05 20 F9         00140 NEXT      BRA    FIRST
        0000       00150           END
```

This program doesn't do anything; it's a infinite loop. It does illustrate jumping an branching, however. The JMP NEXT ir struction assembles with a jump locatio (after the 7E op code) of 3E05. The BR FIRST, though, does not use an absolut address. Instead, it uses a displacemen value of F9. When this displacement valu is added to the contents of the progran counter, the result is the branch address. Th program counter always points to the nex instruction after the current one bein executed, in this case, at $3E07. Addin $3E07 and $F9:

```
  $3E07
+ $FFF9
  -----
  $3E00
```

The displacement value is "sign extended' to the left, which must be done for negative displacements of $FF through $80 (indicating branches backwards). Positive displacements of $00 through $7F (indicating branches forward) may be added without sign extension. In any event, the result is the jump address of $3E00. The BRA FIRST could have been replaced with a JMP FIRST instruction, but this instruction would have used three bytes instead of two bytes and not have been relocatable.

There's a way to make all instructions relocatable. It's a special addressing mode called "program counter relative." An example is shown here:

```
3E00                00100          ORG   $3E00
3E00 A6 8D 0008     00110          LDA   ARG1,PCR
3E04 E6 8D 0005     00120          LDB   ARG2,PCR
3E08 6E 8D 0002     00130  FIRST   JMP   NEXT,PCR
3E0C    00          00140  ARG1    FCB   0
3E0D    00          00150  ARG2    FCB   0
3E0E FD 0000        00160  NEXT    STD   BOTH
3E11 86 01          00170          LDA   #1
```

The machine language assembled for the LDA ARG1,PCR starts off with an op code of A6, followed by an addressing mode byte of 8D. The addressing mode byte is used by the 6809 to determine how the address should be computed. In this case, the effective address is computed by adding the contents of the program counter to the displacement value of 0008, found in the third and fourth bytes of the machine language. The program counter *points to* $3E04 at this point so:

```
  $3E04
+ $0008
  -----
  $3E0C
```

he D register to an integer value and returns : in the variable used on the left side of the ISR call.

Here's a simple example of the whole rocess. The assembly language subroutine dds one to an input argument and returns he incremented value. It's a useless subroutine, but it'll give you a better idea of how he process works.

```
00 'TRIVIAL AL SUBROUTINE
10 CLEAR 1000,&H3DFF                    'protect memory
20 CLS
30 FOR I-&H3E00 to &H3E09               'move mach lang
40 READ A: POKE I,A
50 NEXT I
60 DEFUSR0-&H3E00                       'define start of ml
70 INPUT "VALUE-";V                     'input value
80 V - USR0(V)                          'call al subroutine
90 PRINT "VALUE NOW"; V                 'return and print
00 GOTO 170                             'loop
10 DATA &HBD,&HB3,&HED,&HC3,&H00,&H01
20 DATA &HBD,&HB4,&HF4,&H39
```

The assembly language code for this is:

```
000 BD B3ED  00100      JSR     $B3ED   'convert input
003 C3 0001  00110      ADDD    #1      'bump by one
006 BD B4F4  00120      JSR     $B4F4   'reconvert
009 39       00130      RTS             'return
```

As you can see from the assembly language program, the only processing actually done in the program is to add one to the contents of the D register. The first JSR converts the input argument (found in variable V in the BASIC program) to a value in D. The second JSR reconverts the contents of D (now V plus one) to variable V for output. The RTS, of course, just returns to BASIC.

Packing Arguments

Although only one integer value is allowed, there's no reason several arguments can't be packed into that single value. Suppose you have an assembly language subroutine to move a character around the screen. The inputs to the subroutine would be the character and the speed of movement. These two arguments could be packed into the single 16-bit integer value of the USR call by doing this:

```
100 'MOVE CHARACTER SUBROUTINE
110 CLEAR 1000,&H3DFF                   'protect memory
120 CLS
130 FOR I-&H3E00 to &H3EXX              'move mach lang
140 READ A: POKE I,A
150 NEXT I
160 DEFUSR0-&H3E00                      'define loc'n of al
170 INPUT "CHARACTER-";C$               'input character
175 INPUT "SPEED (0-255)-";S            'input speed
176 CLS
180 A - USR0( ASC((C$)*256+S)           'pack two arguments
200 GOTO 170                            'retrun here
```

The character is converted to an eight-bit ASCII code by the ASC(C$). It is then packed into the most significant byte of the input argument by the ASC(C$)*256. The speed is also an eight-bit value and is in the least significant byte of the input argument. In the assembly language subroutine, the two arguments appear in the D register as shown in Figure 1, after they have been converted by a JSR $B3ED.

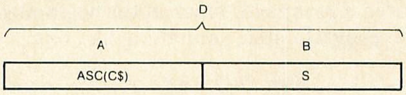

Figure 1: Packing Two Arguments

This same scheme of packing multiple arguments can be used for input and output to pack as many as 16 single-bit arguments into the input or output parameter. On the input side, the arguments are packed by multiplying the value by a power of two so that it's shifted left and adding in other arguments. On the output side, the arguments are unpacked by ADDing and then dividing by the same power of two. Some examples are given in Figure 2.

ARG1
ARG2
ARG3
ARG4

```
Input:
100 D=ARG1*4096+ARG2*256+ARG3*16+ARG4
110 A=USR0(D)

Output:
110 A=USR0(D)
120 ARG1=INT(A/4096)
130 ARG2=INT((A-ARG1*4096)/256)
140 ARG3=INT((A-ARG1*4096-ARG2*256)/16)
150 ARG4=A-ARG1*4096-ARG2*256-ARG3*16
```

Figure 2: Packing Four Arguments

Parameter Block

Another way of passing multiple arguments to and from an assembly language subroutine is by a parameter block. The parameter block is a special area in memory set aside to hold input and output arguments. A simple example of this is shown in Listing 1, which is the partial assembly language listing of the move character subroutine. The first two bytes of the subroutine are reserved for the character and speed input parameters. The actual subroutine starts at &H3E02 rather than &H3E00.

The BASIC code for calling this subroutine is:

```
100 'MOVE CHARACTER SUBROUTINE
110 CLEAR 1000,&H3DFF                   'protect memory
120 CLS
130 FOR I-&H3E00 to &H3EXX              'move mach lang
140 READ A: POKE I,A
150 NEXT I
160 DEFUSR0-&H3E00                      'define start of al
170 INPUT "CHARACTER-";C$               'input character
175 INPUT "SPEED (0-255)-";S            'input speed
176 CLS
180 POKE &H3E00, ASC(C$)                'poke character value
190 POKE &H3E01, S                      'poke speed value
200 A - USR0(0)                         'go to al subroutine
200 GOTO 170                            'return here
```

The USR call uses dummy arguments rather than packing the two input parameters into a single argument. The two input parameters are stored in &H3E00 and &H3E01 by two POKEs. As long as the input parameters are byte values (zero to 255), the POKEs work fine. The assembly language subroutine does not make a call to $B3ED, as there is no argument to convert. It simply picks up the first argument from &H3E00 (character) and puts it into A and the second argument from &H3E01 (speed) and puts it into B.

This concept can be used to pass any number of arguments. Just allocate a large enough chunk of memory to accommodate all of the input and output arguments and then do POKEs before the subroutine is called and PEEKs after the subroutine is called to access the arguments.

It's important to note that the parameter block holding input and output arguments must be in a protected portion of memory. Any address greater than the CLEAR address can be used, and the parameter block can be before or after the actual subroutine. Don't forget to specify the actual starting address of the subroutine, rather than the start of the parameter block, if the parameter block is located before the subroutine.

Using VARPTR

The VARPTR function in BASIC is also handy for passing parameters to assembly language subroutines. The VARPTR function returns an address to a specified variable. Suppose that you had a variable called AA. This code:

```
100 AA-3
110 B-VARPTR(AA)
120 PRINT PEEK(B),PEEK(B+1),PEEK(B+2),PEEK(B+3),
    PEEK(B+4)
```

prints 130, 64, 0, 0, 0. Where's the 3? That's a long story.

You'd expect to see a zero byte followed by a three byte, representing a binary integer number of three. However, Color Computer BASIC variables are always a "floating-point" format, even when you are working with integer limits, such as PEEKs and POKEs. The 130, 64, 0, 0, 0 represents a power of two equal to 130 minus 128 and a fraction of 0.11000000. The result is the power of two (2 squared or 4) multiplied by (½ + ¼) = 4 × (¾) = 3. This is not the easiest way to represent numbers, and it would be very tedious to have to convert to this floating-point format every time you wanted to pass parameters to assembly language. The floating-point representation is why the JSR $B3ED and JSR $B4F4 are used to convert and reconvert variables passed to and from assembly language subroutines.

There's nothing that says that a dummy variable cannot be used to store parameters, however. This code stores 100, 45, 233, 15 and 37 in the location of dummy variable AA. The location of the dummy variable AA is then passed to the assembly language subroutine. However, the assembly language subroutine must still go through the "convert" subroutine to get a 16-bit address value in D to point to dummy variable AA.

BASIC:

```
100 AA-0
110 B-VARPTR(AA)
120 POKE B,100: POKE B+1,45: POKE B+2,233: POKE B+3,15:
    POKE B+4,37
130 DEFUSR0-&H3E00
140 A-USR0(B)
    .
    .
```

BARDEN'S BUFFER

More Interfacing Tricks for Assembly Language and BASIC

By William Barden, Jr.
Rainbow Contributing Editor

Last month we described the elementary steps in tying together short assembly language subroutines with a BASIC program. Although assembly language is a more difficult language in which to write computer programs, it offers one big advantage over BASIC and other "high level" languages — speed. There are many things that can be done in assembly language that just cannot be done in other languages. In the last column we suggested you start using assembly language by interfacing, or joining together, short assembly language subroutines to improve your BASIC program's efficiency.

We discussed the difference between assembly language and machine language — machine language is made up of the binary data the 6809 recognizes as part of its instruction set while assembly language is a more English-like representation of instruction mnemonics. The assembly language form is translated into machine language by a program called the assembler, typically the Radio Shack *EDTASM+* assembler.

We also described some assembly language programs and mechanisms to interface them to BASIC. The BASIC statement that defines where in memory the assembly language code resides is `DEFUSR`, as in `110 DEFUSR = &H3E00`. The BASIC statement to actually make the jump is `USRn`, as in `180 A = USR0(0)`. Each assembly language subroutine must have an ending RTS instruction, which acts like a BASIC `RETURN` statement, returning to the point just after the `USR` call.

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years experience in the industry covers a wide background: programming, systems analyzing and managing projects ranging from mainframes to microcomputers.

Before an assembly language subroutine can be used, however, the memory area in which it is to reside must be protected by a BASIC `CLEAR` statement, as in `110 CLEAR 1000,&H3DFF`. This prevents BASIC from overwriting the machine language bytes as it stores data such as strings and its own internal variables. The machine language code making up the assembly language subroutine is moved into this protected area by loading a machine language program from disk or cassette, or by reading `DATA` statements in BASIC and doing a series of `POKE`s. We chose the `POKE` route for our examples.

The `USRn` statement in BASIC has an argument in it that represents an integer value. A single integer value can be passed to the assembly language subroutine by this argument in a statement such as `180 A = USR0(1000)`, which passes the value of 1,000. The assembly language subroutine may pass an argument back by the `USR`. The argument is returned in the variable on the left side of the `USR` statement; in this example, Variable A contains the result. However, it's perfectly all right to pass no arguments and to use dummy variables in the `USR` statement.

We'll continue with more tricks in interfacing assembly language with BASIC in this column.

Passing Multiple Arguments to AL Subroutines

The argument passed to an assembly language subroutine must be an integer argument — a numeric expression, variable, or combination that can be resolved down to the value of -32768 through +32767. Here are some typical `USR` calls:

```
100 A = USR0(1000)
200 VX = USR1(AC)
300 AN = USR4(1000 - ZT)
```

Passing One Argument

In the assembly language subroutine itself (as we saw last month), the code must do a JSR $B3ED to convert the input argument to a 16-bit value in the D register (the A and B accumulators). After this is done, the assembly language subroutine can use the input argument as required — to define a delay, to point to a work area, to define a character, or any other application.

To pass an argument back to BASIC, a JSR $B4F4 is done in the assembly language code. This converts an output argument in *he CD interface. The article also said that S-9 operating language will be used in hese interfaces. Have you heard about this r is it just another rumor?*

Jim Casselman
Goodfellow AFB, TX

Jim, the 68000 microprocessor and Microware were the hot subject of discussion t the last RAINBOWfest. Microware has een awarded a contract to develop the perating system for Phillips and Sony, the wo pioneers in Compact Disc technology. t seems to be the next major breakthrough n storage media. I can't wait to see one.

Device Overload

• *I have a 64K Color Computer 1 with a J&M disk drive system and a DCM-5 Auto/ Answer modem. How does one operate a disk controller, a DS-69A Digitizer, a* CoCoMax *joystick port and an RS-232C Deluxe Pak all at once? It is all on one switch, and obviously it would be very difficult to switch to each slot. This leaves the option of switching using software.*

Jeff Wozniak
Apply Valley, MN

Even though you can both hardware-, and software-select a Multi-Pak slot, the address and data lines are connected to the device at all times, Jeff. This means by adding address decoding circuitry to the accessories you mention, they can all be resident at the same time. Remember, the CoCo can switch between these devices about 250,000 times a second.

Nonexistent Clock Signal

• *I recently purchased a VIC 1525 graphics printer by Commodore. It resembles the DMP-100 printer by Radio Shack.*

I would like to use the 1525 with my CoCo. Can it be done? What wiring configuration do I make to connect serial I/O ports?

Philip Tack
Worthington, PA

Philip, according to the diagram you sent us, the VIC 1525 requires a clock signal from the computer. This signal is not present on the CoCo serial port.

Disk Drive Debate

• *I am debating buying a hard disk or a floppy disk drive. How compatible is an Amdek hard disk with the software on the market, and how much extra storage does it have?*

Byron Fast
Kleefeld, Manitoba

Byron, I am not aware of an Amdek hard disk. I do know that Amdek makes a 3½ inch floppy disk. It is the same as a 5¼ inch floppy disk, except it is packaged a little differently. It has the same storage capacity. I would recommend you have at least one 5¼ inch disk drive in your system.

New VDG for Older CoCos

• *The CoCo has an MC6847 Video Display Generator (VDG) that is less than perfect. Motorola has designed a new VDG, the MC6847T1, which will soon be released for full production. What does it do? It makes clearer symbols, changes the 'o' from square to circular, adds a slash to the zero and gives lowercase with descenders. The MC6847T1 has a data latch 74LS273 and a buffer 74LS244 on board.*

How can you use it? Find the VDG (MC6847T1) when released. Remove the 74LS273 from the circuit board and jumper the socket so the lines go straight through. Use two sockets (40 pin) to make a jumper socket for the VDG. Jumper the data lines 3 through 8. Connect pin 10 to pin 25 with a 2.5K ohm resistor. This allows pseudo colors. Connect pins 12, 17 and 24. This disables the I/O lines not used by the CoCos. This is the area that replaces the 74LS244 (buffer). It would require extensive wiring to use it. Connect pin 13 of the VDG to pin 11 of the 74LS273 socket. This is the RAS signal and it stabilizes the output. Connect an SPDT switch by connecting one side to pin 1 of the VDG, center to pin 31 of the VDG, and the other side to pin 31 of the VDG socket. Make sure pins 12, 13, 25, 26 and 31 are not connected through to the circuit board side.

What happened to the lowercase? This is caused by a ROM text screen 0 reset; to disable it use `POKE 359,57`*. The only problem with this poke is that if you are running a graphics program and have an error in it, the text screen does not come back with the error message. You must enter text screen. Next enter* `POKE 65314,X`.

If X is:	Text is:
0-7	Black letters on green uppercase and reverse video.
8-15	Red letters on orange uppercase and reverse video.
16-23	Black letters on green uppercase and lowercase.
24-31	Red letters on orange uppercase and lowercase.
32-39	Light green letters on dark green uppercase and reverse video.
40-47	Orange letters on red uppercase and reverse video.
48-55	Light green letters on dark green uppercase and lowercase.
56-63	Orange letters on red uppercase and lowercase.
64-71	Dark green letters on light green uppercase and reverse video.
72-79	Red letters on orange uppercase and reverse video.
80-87	Black letters on light green with light green border uppercase and lowercase.
88-95	Red letters on orange with orange border uppercase and lowercase.
96-103	Light green letters on dark green uppercase and reverse video.
104-111	Orange letters on red uppercase and reverse video.
112-119	Light green on dark green uppercase and lowercase.
120-127	Orange letters on red uppercase and lowercase.
128-255	Graphics.

You can get data sheets on the MC6847 and MC6847T1 from Motorola, as well as any other component they produce, by requesting it.

William Capich
FPO, NY

Thanks for the information, William. There seems to be a lot of interest in the 6847T1, and due to your help we can all put one in our older CoCos now.

Memory Exploration

• *I'm writing a machine language program to allow exploring CoCo memory. I want it to work in 64K RAM mode without the ROM support. I have to build every routine and most of them are finished except two:*

`INKEY` *— I can't figure out how I can scan the PIA for the SHIFT key.*

RS-232 — I don't understand how to send information to the printer and how the timing process works.

Marc Gagnon
Cap-de-la-Madeleine, Quebec

Marc, you need to obtain a disassembly of BASIC to fully understand the `INKEY$` and RS-232 routines. *Color BASIC Unravelled* will do nicely.

If you want to try on your own, the `INKEY$` routine starts at $A564. The test for the SHIFT key routine is at $A22E. The RS-232 output routine starts at $A2BF. All of the above addresses are for Color BASIC 1.2. Good luck.

Your technical questions are welcomed. Please address them to: Downloads, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for space and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Your technical questions may also be sent to us through the MAIL section of our new Delphi CoCo SIG. From the CoCo SIG> prompt, pick DELPHI MAIL, then type `SEND` **and address TO: DANDOWNARD. Be sure to include your complete name and address.**

Non-Standard Disk Drive Troubles

By Dan Downard
Rainbow Technical Editor

• *I have a problem with a Tandon Disk drive 1 system. I own a 64K Extended* BASIC *CoCo 2 and a TRS-80 Drive 0 with Disk* BASIC *1.1 (Cat. No. 26-3029).*

When the Tandon Drive 1 is connected, it works fine, but when I try to use my Radio Shack Drive 0, I always get an I/O Error. To use the Radio Shack Drive, I have to disconnect or turn off the Tandon Drive.

When both are connected, the indicator light on the Radio Shack Drive goes on, but the head inside the Tandon Drive goes back and forth searching for the program or tries to read a directory for Drive 0.

Ben Takemura
Honolulu, HI

Ben, it appears that the drive select lines on your Drive 1 are being enabled for both Drive 0 and Drive 1. A normal disk drive uses two pins for drive select and has binary decoding circuitry to distinguish which drive it's supposed to be. CoCo disk systems use a separate drive select pin for each of four possible drives.

Get a copy of the RAINBOW for July 1985 and read "Getting On the Right Track" by Colin Stearman. This is an excellent article discussing the use of non-standard disk drives (non-Tandy) with a CoCo.

Dan Downard is an electrical engineer and has been involved in electronics for 27 years through ham radio (K4KWT). His interest in computers began about eight years ago and he has built several 68XX systems.

Keep Your Cool

• *Some time ago someone offered a schematic to change the RS Modem I to auto-answer (and possibly auto-dial). I would like some information, please.*

I own an F board and am running 64K, one drive, 1.1 Disk BASIC *and 1.1 Color* BASIC. *I have upgraded to 150 ns 64K chips, a 68B09E and a 68B21. I am able to run the CoCo in 3x mode and, about 50 percent of the time, retain graphics. Is there anything I can do about the 2N6594 transistor which creates a heat problem? I replaced it with heavy-duty NTE219 and heat sunk it, but I still need to run a fan on it.*

Kenneth Harman
Bakersfield, CA

You are correct Kenneth. In the November 1984 RAINBOW, Tony Sharp wrote an article on how to convert a Modem I to auto-answer. It was titled "Adding an Auto Answer."

The only thing a heat sink does is allow the heat to dissipate. Unless the heat sink is external to the computer, the heat stays inside until air from the ventilation holes cool it. It's best not to block the ventilation holes by enclosing your computer. If you do, it's necessary to add a fan to get rid of the heat.

Elusive I/O Error

• *I am 12 years old and I own a 64K Color Computer 2 and a CCR-82 cassette recorder. Whenever I try to load a long program I receive an I/O Error. Sometimes, such as early morning, everything works fine. When I take my equipment to Radio Shack it works great! I take it home and it doesn't work.*

I have tried everything, cleaning the heads, turning off different appliances etc., but it still does not work. Any help would be appreciated.

Josh Alkire
Toledo, OH

It sounds like you have some type of power line disturbance in your home, Josh. I suggest you operate the tape recorder from batteries just to see if it's the power line.

Half-Power 64K?

• *I have a 64K ECB CoCo and a cassette recorder. I know that without a disk drive and operating system I can only access 32K RAM. Does this mean I only have a 32K system or can I run cassette programs like* The Sailor Man *that require 64K?*

Mike Frei
Horicon, WI

Mike, you don't need a disk drive, or an operating system to use 64K in your CoCo. You can indeed play your favorite 64K games from tape. A disk operating system allows for more efficient use of your 64K, but it's not necessary.

CD Rumors A-flyin'

• *I read in the Computer Shopper that the 68000 processor will be used as the CPU for*

```
00300          FDB     JPORT-JOYTAB     INPUT
00400          FDB     GETMAX-JOYTAB
00500          FDB     XPAD-JOYTAB
00600          FDB     HIRES-JOYTAB
00700
00800 JOYSTK   LDA     JOYTYP,U         GET JOYSTICK TYPE
00900          LSLA                     MUL BY 2 FOR 16 OFFSET
01000          LEAX    JOYTAB,PCR       GET VECTOR OFFSET TABLE INPUT
01100          LDD     A,X              GET OFFSET FOR THAT ONE
01200          JMP     D,X              CALL THE INPUT READING
01300
01400 *THIS ONE READS JOYSTICK POSITION FROM HI-RES INTERFACE FROM R-S
01500 HIRES    CLRA                     SELECT RIGHT JOYSTICK
01600          BSR     BUTSTA           AND GET BUTTON STATUS
01700          LDD     YJOY,U           GET OLD X & Y POSITION
01800          COM     FLIP,U           DO THE READING 30 TIMES A SEC.
01900          BMI     HIRES9           (SKIP READING 1/2 THE TIME!)
02000
02100          LDX     #$FF00           BASE ADDRESS OF PORTS
02200          LDA     $23,X            GET THE SOUND ON/OFF BIT
02300          LDB     $20,X            AND DAC BITS
02400          PSHS    D                SAVE THEM
02500          ANDA    #$F7             TURN OFF SOUND
02600          STA     $23,X
02700
02800          LDA     1,X              GET THE L.S.BIT AND
02900          LDB     3,X              M.S.BIT OF THE JOY SELECTOR
03000          PSHS    D                SAVE THEM
03100
03200          ANDB    #$F7             SELECT JOYSTICK 0
03300          STB     3,X
03400          ORA     #8               AND SELECT Y INPUT OF JOYSTICK
03500          STA     1,X
03600
03700          BSR     HIRES1           READ Y VAL 0-255
03800          LDA     #192             MAKE IT 0 TO 191
03900          MUL
04000          PSHS    A                SAVE THE Y POSITION
04100
04200          LDA     1,X              SELECT X INPUT FOR READING
04300          ANDA    #$F7             BY RESET LSB OF SELECTOR
04400          STA     1,X
04500          BSR     HIRES1           DO A 0 TO 255 READING
04600          LSRB                     MAKE IT 0 TO 127 FOR X
04700          PULS    A                GET SAVED Y POSITION
04800          TFR     D,Y              SAVE BOTH X & Y
04900
05000          PULS    D                GET OLD DATA OF SELECTOR
05100          STA     1,X              AND RESTORE THE PORTS
05200          STB     3,X
05300
05400          PULS    D                GET SOUND ON/OFF AND DAC DATA
05500          STB     $20,X            AND RETORE
05600          STA     $23,X
05700          TFR     Y,D              LOAD UP X & Y VAL (SAVED IN Y)
05800 HIRES9   RTS                      EXIT
05900
06000 * THIS IS A HI-RES INTERFACE READ (0 TO 255)
06100 HIRES1   PSHS    CC               SAVE IRQ & FIRQ FLAGS
06200          LDA     #$FF             USE DAC (OF CASSETTE) TO RESET
06300          STA     $20,X            THE TIMING RAMP GEN.
06400          LDA     #45              THIS SHOULD DO IT
06500 HIRES2   DECA                     DO A TIMING LOOP
06600          BNE     HIRES2
06700
06800          LDD     #2*256+126       USED TO START TIMING RAMP
06900          ORCC    #$50             DISABLE IRQ & FIRQ
07000          STA     $20,X            START TIMEING RAMP
07100 HIRES3   DECB
07200          BNE     HIRES3
07300 HIRES4   LDA     ,X               HAS J-STICK MATCH RAMP?
07400          BMI     HIRES5           YES, THEN EXIT LOOP!
07500          NOP                      MAKE LOOP THE RIGHT TIMING
07600          NOP
07700          NOP
07800          INCB                     NO, DOWN COUNT THEN
07900          BNE     HIRES4           IF NO TIME OUT THEN LOOP AGAIN
08000
08100          DECB                     MAKE IT 255 IF TIMED OUT
08200 HIRES5   PULS    PC,CC            EXIT WITH ERROR (RESTORE IRQS)
08300
08400
08500 *THIS DOES A BUTTON READ OFF THE RIGHT/LEFT JOYSTICK
08600 BUTSTA   PSHS    A                SAVE RIGHT/LEFT FLAG
08700          LDX     #$FF00           POINT TO THE I/O PORT
08800          LDA     2,X              GET THE KEY SELECT DATA
08900          LDB     #$FF             SELECT NO KEYS
09000          STB     2,X              TO READ JUST THE BUTTONS
09100          PULS    B                GET RIGHT/LEFT BUTTON SELECT
09200          INCB                     MAKE IT "01"(R) OR "10" (L)
09300          COMB                     MAKE SELECTED BIT ZERO
09400          ORB     ,X               IS GET THAT BUTTON BIT
09500          STA     2,X              RESTORE KEY SELECT DATA
09600          COMB                     MAKE IT A ONE IF PRESS
09700          ANDB    #3               ONLY RIGHT/LEFT BUTTON BITS!
09800          STB     BUTDWN,U         UPDATE BUTTON DOWN STATUS
09900          RTS                      AND EXIT
10000
10100 *THIS ONE READS THE 6 DAC PORT FOR THE RIGHT/LEFT JOYSTICKS
10200 JPORT    LDA     JOYTYP,U         GET RIGHT/LEFT FLAG
10300          BSR     BUTSTA           GET BUTTON DOWN STATUS
10400          PSHS    U                SAVE VARIABLE BLOCK POINTER
10500          LDX     #$FF00           POINT TO I/O PORTS
10600          LDA     $23,X            GET SOUND ON BIT
10700          LDB     $20,X            AND DAC LEVEL DATA
10800          TFR     D,Y              AND SAVE THEM
10900          ANDA    #255-8           TURN OFF SOUND BIT
11000          STA     $23,X
11100
11200          LDA     1,X              GET JOYSTICK/AUDIO
11300          LDB     3,X              SELECTOR BIT
11400          TFR     D,U              AND SAVE THEM TOO
11500          ORA     #8               SELECT Y READING
11600          STA     1,X
11700          ANDB    #$FF-8           SET RIGHT JOYSTICK FOR NOW
11800          PSHS    B                AND SAVE IT OR NOW
11900          LDB     JOYTYP+DATA,PCR    GET RIGHT/LEFT FLAG
12000          LSLB                     PUT THE BIT (0) IN BIT 2
12100          LSLB
12200          LSLB
12300          ORB     ,S+              NOW SELECT LEFT/RIGHT
12400          STB     3,X
12500
12600          BSR     JOYSK0           DO 6 BIT DAC READ FOR Y
12700          LDA     #3               AND MAKE THE 0 TO 63
12800          MUL                      TO 0 TO 189 STEPS OF 3
12900          PSHS    B                AND SAVE IT
13000          LDA     1,X              NOW SELECT X POSITION
13100          ANDA    #255-8           BY RESETTING THE SELECT BIT
13200          STA     1,X
13300          BSR     JOYSK0           DO 6 BIT DAC FOR X POSITION
13400          LSLB                     MAKE 0 TO 63 TO 0 TO 126 STEP 2
13500          PSHS    B                SAVE IT FOR NOW
13600          TFR     U,D              RESTORE JOY/AUTO
13700          STB     3,X              SELECTOR
13800          STA     1,X
13900
14000          TFR     Y,D              RESTORE SOUND ON BIT AND DAC
14100          STB     $20,X
14200          STA     $23,X
14300          PULS    B                GET X POSITION DATA
14400          PULS    PC,U,A           GET Y POSITION DATA AND EXIT
14500
14600 JOYSK0   LDD     #$4080           START DAC LEVEL
14700 JOYSK1   PSHS    A                SAVE START NUMBER
14800          ORB     #2               MAKE PRINTER HIGH
14900          STB     $20,X            SEND IT TO THE DAC
15000          EORB    #2               REMOVE PRINTER BIT
15100          LDA     ,X               IS IT ABOVE OR BELOW?
15200          BMI     JOYSK2           SKIP IF ABOVE
15300
15400          SUBB    ,S               REMOVE 1/2 IF BELOW
15500          BRA     JOYSK3
15600
15700 JOYSK2   ADDB    ,S               ADD 1/2 IF ABOVE
15800 JOYSK3   PULS    A
15900          LSRA
16000          CMPA    #1
16100          BNE     JOYSK1           LOOP 6 TIMES
16200          LSRB                     PUT THE DAC BITS IN 0-5 BIT
16300          LSRB                     FOR JOYSTICK VAL
16400          RTS                      AND EXIT
16500
16600 XPAD     LDB     $FF60            GET X-PAD X POSITION
16700          LSRB                     MAKE IT 0 TO 127
16800          LDA     $FF61            GET X-POS Y POSITION
16900          PSHS    D                SAVE IT FOR UPDATEING
17000          LDB     $FF62            GET STATUS OF X-PAD
17100          BITB    #2               IS PEN IN PROXIMITY?
17200          BNE     XPAD1            DON'T UPDATE JOYVAL IF NOT
17300          LDD     YJOY,U           ELSE GET OLD X & Y POSITION
17400          STD     ,S               AND SAVE IT
17500          CLRB                     MAKE PEN UP (NOT PRESSED)
17600          BRA     XPAD9            DO NOT LOOK AT NEW X & Y
17700 XPAD1    BITB    #4               IS PEN IN X MARGIN?
17800          BEQ     XPAD2            YES, THEN USE IT
17900          LDA     XJOY,U           GET THE OLD X POSITION
18000          STA     1,S              UPDATE THE OLD X VAL.
18100
18200 XPAD2    BITB    #8               IS PEN IN Y MARGIN?
18300          BEQ     XPAD9            YES, THEN UPDATE
18400          LDA     YJOY,U           ELSE USE OLD Y POSITION
18500          STA     ,S               UPDATE THE OLD Y VAL.
18600 XPAD9    ANDB    #1               GET PEN STATUS
18700          STB     BUTDWN,U
18800          PULS    PC,D             EXIT READ X-PAD
18900
19000 GETMAX   PSHS    D                SETUP TEMP FOR JOY VAL.
19100          LDX     #$FF90           POINT TO COCO MAX PORT
19200          BSR     READMX           READ PORT AND SKIP IT
19300          BSR     READMX           READ PORT
19400          LDB     #192             AND MAKE  0 TO 255 TO
19500          MUL                      0 TO 191
19600          STA     ,S               FOR Y POSITION
19700          BSR     READMX           READ PORT
19800          LSRA                     MAKE IT 0 TO 127
19900          STA     1,S              AND SAVE X POSITION
20000          BSR     READMX           READ PORT
20100          COMA                     FOR BUTTON
20200          ANDA    #128             <128 THEN DOWN
20300          STA     BUTDWN,U         >127 THEN UP
20400          PULS    PC,D             GET X & Y AND EXIT
20500
20600 READMX   LDA     ,X+              READ COCO MAX PORT
20700          LDB     #10              DO A TIME DELAY LOOP
20800 RDMX1    DECB
20900          BNE     RDMX1
21000          RTS                      AND EXIT
```

```
02800         CMPB   #128-12         NOW TEST IF PART OF X LEN OFF
02900         BHS    CURON0          OF SCREEN (SKIP IF SO)
03000         COM    FAST,U          DO FAST CURSOR DRAW ALL ON SCREEN
03100
03200 CURON0  PSHS   B               SAVE X POSITION
03300         TFR    X,U             LOAD U WITH CURSOR SHAPE DATA
03400
03500         CMPA   #192+5          IS THE LINE A NEGATIVE LINE?
03600         PSHS   CC              SAVE TEST FLAGS
03700         BLO    CURON1
03800         NEGA                   IF SO THEN MAKE POSITIVE LINE
03900 CURON1  LDB    #32             CONVERT LINE TO MEMORY POSITION
04000         MUL
04100         PULS   CC              GET TEST FLAGS
04200         BLO    CURON2          SKIP IF PLUS
04300         COMA                   NEG THE D REG
04400         COMB
04500         ADDD   #1
04600 CURON2  ADDA   SSTART          OFFSET TO BASIC SCREEN POSITION
04700         TFR    D,X             AND PUT IN 16-BIT POINTER
04800         LDB    ,S              GET X POSITION
04900         ASRB                   GET BYTE POSITION ON SCREEN
05000         ASRB                   BY 1/4
05100         STB    STRIP+DATA,PCR  SAVE FOR COUNTING LATER
05200         LEAX   B,X             ADD IT TO THE SCREEN POINTER
05300         STX    MEMPOS+DATA,PCR AND MEMORY POINTER TOO
05400         PULS   A               GET THE X POSITION
05500         ANDA   #3              GET THE OFFSET INTO THE BYTE ON LINE
05600         LDB    #3*16*2         SIZE OF SHAPE
05700         MUL                    MUL IT BY THE SHAPE SIZE IN "B"
05800         LEAU   D,U             AND OFFSET THE SHAPE POINTER BY IT
05900
06000         LDA    #16             NUMBER OF LINE IN CURSOR OF DATA
06100         LDB    FAST+DATA,PCR   DO WE DO A FULL OR PART DRAW?
06200         BNE    ONFAST          SKIP IF FAST!
06300
06400 CURON3  CMPX   SSTART          IS THIS LINE ABOVE THE SCREEN?
06500         BLO    CURON6          SKIP IF OFF THE SCREEN
06600         PSHS   X,U,A           SAVE POINTER AND Y-COUNT
06700         LDA    #3              3 BYTE PER LINE
06800         LDB    STRIP+DATA,PCR  GET (BYTE) LINE POSITION
06900 CURON4  CMPB   #32             ARE WE TO FAR LEFT/RIGHT?
07000         BHS    CURON5          SKIP THIS BYTE IF SO
07100         CMPX   SEND            IS THE BYTE ABOVE SCREEN?
07200         BHS    CURON5          SKIP BYTE IF SO
07300         PSHS   A               SAVE X COUNTER
07400         LDA    ,X              GET DATA OFF THE SCREEN
07500         STA    ,Y+             SAVE IT IN UNDER BUFFER
07600         ANDA   ,U              AND IT WITH MASK OF CURSOR
07700         EORA   3*16,U          THEN FLIP BITS WITH EOR DATA
07800         STA    ,X              AND PLACE IT ON THE SCREEN
07900         PULS   A               GET X COUNT
08000 CURON5  LEAX   1,X             MOVE NEXT BYTE ON THE LINE
08100         LEAU   1,U             AND NEXT BYTE IN SHAPE DATA
08200         INCB                   MOVE TO NEXT BYTE STRIP
08300         DECA                   DONE WITH THIS LINE?
08400         BNE    CURON4          NO, LOOP BACK THEN
08500         PULS   X,U,A           RESTORE POINTERS TO START OF LINE
08600 CURON6  LEAX   32,X            MOVE SCREEN POINTER TO NEXT LINE
08700         LEAU   3,U             MOVE SHAPE POINTER TO NEXT LINE
08800         DECA                   ARE ALL LINES DONE?
08900         BNE    CURON3          NO, LOOP BACK
09000         PULS   PC,CC,U         RESTORE IRQS, VAR POINTER & EXIT
09100
09200 *THIS IS A FAST CURSOR DRAWER
09300 ONFAST  STA    COUNT+DATA,PCR  SET LINE COUNTER
09400 ONFST1  LDD    ,X              GET FIRST 2 BYTES OF LINE
09500         STD    ,Y++            SAVE THEM IN UNDER BUFFER
09600         ANDA   ,U              AND THE MASK DATA
09700         EORA   16*3,U          FLIP DATA TOO
09800         ANDB   1,U             NOW THE NEXT BYTE ON LINE
09900         EORB   16*3+1,U
10000         STD    ,X++            PUT BOTH ON SCREEN
15100 CUROF5  LEAX   32,X            MOVE TO NEXT LINE
15200         DECA                   ARE ALL LINES DONE?
15300         BNE    CUROF1          NO, THEN LOOP BACK
15400         PULS   PC,CC           TURN ON IRQS AND EXIT
15500
15600 OFFAST  STA    COUNT,U         SET UP LINE COUNTER
15700 OFFST1  LDD    ,Y++            GET FIRST 2 BYTE OF UNDER DATA
15800         STD    ,X++            AND PUT IT ON SCREEN
15900         LDB    ,Y+             GET LAST BYTE ON LINE OF UNDER
16000         STB    ,X              AND PUT IT TOO ON SCREEN
16100         LEAX   32-2,X          MOVE TO NEXT LINE ON SCREEN
16200         DEC    COUNT,U         ALL LINES DONE?
16300         BNE    OFFST1          LOOP IF NOT
16400         PULS   PC,CC           TURN OF IRQS AND EXIT
16500
16600 *DISABLE MOUSE SOFTWARE (UNLINK) (#6)
16700 DSABLE  LBSR   TURNOF          TURN OFF CURSOR IF ON SCREEN
16800         LDX    OLDIRQ,U        GET OLD IRQ VECTOR
16900         STX    $10D            AND PUT IT BACK
17000         LDD    OLDIO,U         GET OUTPUT VECTOR
17100         STD    $168            AND PUT IT BACK
17200         LDD    OLDCOM,U        GET OLD COMMAND TABLE VECTOR
17300         STD    $123            AND PUT IT BACK
17400         CLRB                   RETURN A ZERO FOR FUCTION
17500         RTS                    AND EXIT
17600
17700 * SELECT TYPE OF JOYSTICK TO USE (9-13)
17800 *  9 = RIGHT JOYSTICK
17900 * 10 = LEFT  JOYSTICK
18000 * 11 = COCO MAX HI-RES INPUT MODULE
18100 * 12 = RADIO SHACK X-PAD
18200 * 13 = HI-RES JOYSTICK INTERFACE
18300 SELJOY  SUBB   #9              FIRST SELECT COMMAND (RIGHT)
18400         STB    JOYTYP,U        SELECT JOYSTICK TYPE
18500         RTS                    AND EXIT
18600
18700 *THIS IS THE IRQ PATCH FOR THE MOUSE SOFTWARE
18800 IRQ     LEAU   DATA,PCR        SETUP VARIABLE POINTER
18900         LDX    NEWJOY,U        GET THE NEW JOYSTICK X & Y POSITIO
19000         LDA    HOLD,U          MAKE SURE THAT CURSOR IS OFF IF
19100         ORA    CSTAT,U         ON HOLD
19200         CMPA   #64             IF CURSOR IS TURNED OFF OR HOLD
19300         BEQ    IRQ1            >0 THEN REMOVE CURSOR... ELSE...
19400         CMPX   YJOY,U          IS THE OLD AND POSITION THE SAME?
19500         BEQ    IRQ2            SKIP DRAW CURSOR THEN
19600         PSHS   X               SAVE NEW X & Y POSITION
19700         LBSR   CUROFF          REMOVE CURSOR
19800         PULS   X               RESTORE NEW X & Y POSITION
19900         LDA    HOLD,U          IS CURSOR ON HOLD?
20000         BNE    IRQ2            SKIP IF SO
10100         LDA    ,X              GET LAST BYTE ON LINE
10200         STA    ,Y+             SAVE IN UNDER BUFFER
10300         ANDA   2,U             AND WITH MASK
10400         EORA   2+16*3,U        FLIP WITH DATA
10500         STA    ,X              PUT ON SCREEN
10600         LEAU   3,U             GOTO NEXT LINE IN SHAPE
10700         LEAX   32-2,X          SKIP TO NEXT LINE ON SCREEN
10800         DEC    COUNT+DATA,PCR  ARE ALL LINES DONE
10900         BNE    ONFST1          NO, LOOP BACK
11000         PULS   PC,U,CC         RESTORE IRQS, VAR POINTER & EXIT
11100
11200 * TURN OFF CURSOR (#0)
11300 TURNOF  PSHS   CC              SAVE IRQ FLAGS
11400         ORCC   #$50            TURN OFF IRQS
11500         LDB    CSTAT,U         GET CURSOR STATUS FLAG
11600         ANDB   #255-64         DISABLE DRAWING CURSOR ON IRQ
11700         STB    CSTAT,U         AND SAVE NEW STATUS
11800         BSR    CUROFF          REMOVE CURSOR IF ON SCREEN
11900 OEXIT   PULS   PC,CC           TURN ON IRQS AND EXIT
12000
12100 CUROFF  PSHS   CC              SAVE IRQ FLAGS
12200         ORCC   #$50            TURN OFF IRQS
12300         LDB    CSTAT,U         GET CURSOR STATUS
12400         BPL    OEXIT           EXIT NO CURSOR ON SCREEN
12500         ANDB   #127            SET CURSOR ON SCREEN FLAG
12600         STB    CSTAT,U         TO OFF AND SAVE
12700         LEAY   CURBUF,PCR      GET BUFFER OF DATA UNDER CURSOR
12800         LDX    MEMPOS,U        GET SCREEN (MEM) POSITION OF CURSOR
12900
13000         LDA    #16             NUMBER OF LINES OF CURSOR
13100         LDB    FAST,U          WAS CURSOR DRAWN FAST OR CLIPED?
13200         BNE    OFFAST          SKIP IF FAST!
13300
13400 CUROF1  CMPX   SSTART          IS MEMORY POINTER BELOW SCREEN?
13500         BLO    CUROF5          SKIP IF SO
13600         PSHS   A,X             SAVE SCREEN POINTER & LINE COUNTER
13700         LDB    STRIP,U         GET BYTE X POSITION
13800         LDA    #3              3 BYTES PER LINE
13900         STA    COUNT,U         SET X COUNTER WITH IT
14000 CUROF2  CMPB   #32             TOO FAR LEFT OR RIGHT?
14100         BHS    CUROF3          SKIP IF SO
14200         CMPX   SEND            IS MEMORY POINTER ON SCREEN?
14300         BHS    CUROF3          SKIP IF OFF SCREEN
14400         LDA    ,Y+             GET UNDER CURSOR BYTE
14500         STA    ,X              PUT IT ON SCREEN
14600 CUROF3  LEAX   1,X             MOVE TO NEXT BYTE ON LINE
14700         INCB                   MOVE INDEX COUNTER
14800         DEC    COUNT,U         ARE ALL BYTE DONE ON THIS LINE?
14900         BNE    CUROF2          NO, THEN LOOP BACK
15000         PULS   X,A             GET START OF LINE POINTER & COUNTER
20100 IRQ1    STX    YJOY,U          UPDATE CURSOR POSITION
20200         LBSR   CURON           DRAW CURSOR
20300         BRA    IRQ3
20400 IRQ2    LDB    HOLD,U          ARE WE ON HOLD?
20500         BEQ    IRQ3            SKIP IF NOT
20600         DEC    HOLD,U          COUNT IT TILL ZERO THEN
20700
20800 IRQ3    LEAX   <IRQ5,PCR       SETUP RETURN ADDRESS
20900         PSHS   X               PUT IT ON STACK FOR AN RTI
21000         PSHS   U,Y,X,D,CC,DP   FILL IN THE REST OF RTI STACK DATA
21100         JMP    [OLDIRQ,U]      CALL BASIC'S IRQ VECTOR
21200
21300 IRQ5    BSR    JOYSTK          NOW WE ARE BACK, DO JOYSTICK READ
21400         STD    NEWJOY,U        AND SAVE THE X & Y POSITIONS
21500         LDB    BUTDWN,U        GET BUTTON UP/DOWN FLAG
21600         LDA    BUTCNT,U        AND BUTTON DE-BOUNCE COUNTER
21700         BEQ    IRQ6            SKIP IF AT ZERO
21800
21900         TSTB                   IS BUTTON PRESSED?
22000         BNE    IRQ7            RESTART BUTTON COUNT (SKIP TO IT)
22100         DEC    BUTCNT,U        ELSE DEC DEBOUCE COUNT
22200         BRA    IRQ9            SKIP (ALL DONE HERE)
22300
22400 IRQ6    TSTB                   IS BUTTON UP?
22500         BEQ    IRQ9            SKIP IF SO
22600         STB    BUTTON,U        SET JUST PRESSED FLAG
22700 IRQ7    LDA    #2              RESET DE-BOUNCE COUNTER
22800         STA    BUTCNT,U
22900 IRQ9    RTI                    EXIT IRQ
```

Listing 3:

```
00100 * JOYSTICK DRIVERS
00200 JOYTAB  FDB    JPORT-JOYTAB    VECTOR TABLE FOR DOING JOYSTICK
```

```
11700          STX     $168            AND SET SYSTEM WITH IT
11800          CLR     PMODE,U         CLEAR (RESET) PRINTING MODE
11900          LDX     $123            GET ADDRESS OF COMMAND TABLE
12000          LDB     $120            GET # OF COMMANDS
12100          CMPB    #$35            IS IT 53 COMMANDS?
12200          BNE     COMERR          SKIP ADDING @ IF NOT
12300
12400          LEAY    COMBUF,PCR      GET SPACE FOR HOLDING TABLE
12500          LSLB                    2 BYTES PER COMMANDS (FOR COPY)
12600          STX     OLDCOM,U        SAVE OLD POINTER ADDRESS
12700          STY     $123            POINTER TO MOUSE COMMANDS BUF
12800 SLOOP    LDA     ,X+
12900          STA     ,Y+
13000          DECB
13100          BNE     SLOOP
13200
13300          LDD     COMBUF+7*2,PCR  GET ADDRESS OF OLD PRINT COMMAND
13400          STD     OLDPRT,U        SAVE FOR PATCH SUBR.
13500          LEAX    NPRINT,PCR      GET ADDRESS OF THE PATCH FOR PRINT
13600          STX     COMBUF+7*2,PCR  UPDATE JUMP TABLE FOR NEW PRINT
13700 COMERR   PULS    X,Y,U,D         THEN RESTORE THE REGS
13800
13900 USR1     TSTA                    IS THE VARIABLE A STRING OR NUMBER
14000
14100          BNE     USR9            EXIT IF STRING
14200          JSR     $B3ED           PUT FUNCTION NUMBER IN THE D REG
14300          CMPD    #LASTCM         IS IT TOO BIG?
14400          BHI     USR9            EXIT IF SO
14500          PSHS    X,Y,U,B         SAVE SOME REGS
14600          LEAU    DATA,PCR        SET U REG TO VARIABLE BLOCK
14700          LEAY    COMTAB,PCR      GET FUNCATION (COMMANDS) TABLE
14800          LSLB                    MUL FUNCTION BY 2 (16 BIT)
14900          LDD     B,Y             GET OFFSET FROM TABLE
15000          LEAY    D,Y             ADD IT TO Y FOR ADDRESS OF IT
15100          PULS    B              RESTORE FUNCTION NUMBER IN B REG
15200          JSR     ,Y             AND CALL THE FUNCTION
15300          PULS    X,U,Y          RESTORE OTHER REGS
15400          CLRA           CLR TOP HALF OF 16 BIT RETURN
15500          JMP     $B4F4   CONVERT D REG TO NUMBER & EXIT
15600
15700
15800 * GET X POSITION FUCTION (#2)
15900 GETX     LDB     XJOY,U         GET CURSOR X POSITION
16000 USR9     RTS                    AND RETURN IT
16100
16200 * GET Y POSITION FUCTION (#3)
16300 GETY     LDB     YJOY,U         GET CURSOR Y POSITION
16400          RTS                    AND RETURN WITH IT
16500
16600 GETBUT   LDB     BUTTON,U       GET JUST PRESS BUTTON FLAG
16700          CLR     BUTTON,U       AND RESET THAT FLAG
16800          RTS                    THEN EXIT
16900
17000 GETDWN   LDB     BUTDWN,U       GET BUTTON UP/DOWN STATUS
17100 CEXIT    RTS                    AND EXIT
40000
40100 * MY ASSEMBLER USES "+GET" TO INCLUDE A FILE WHEN THE SOURCE CODE
40200 * IS TOO BIG FOR ONE FILE
40300 * THE +GET IS LIKE "USE" IN THE OS-9 ASSEMBLER
40400
40402          +GET    MOUSE2         GET CURSOR DRAW CODE
40500          +GET    MOUSE3         GET JOYSTICK DRIVERS
40600          +GET    MOUSE4         GET SOUND & SCREEN DRIVERS
40602          +GET    MOUSE5         GET SOUND & SCREEN (PART 2)
40700          +GET    MOUSE6         GET CHR DATA FILE
40800
40900          FCC     'MOUSE VERSION 2.0 '
41000          FCC     'COPYRIGHT 1986 BY SRB SOFTWARE '
41100          FCC     'ALL RIGHTS RESERVED '
41300          FCC     'PUBLIC DOMAIN BY STEVE BJORK '
41500
41600 ENDPRG   EQU                    END OF PROGRAM POINTER
41700
41800          END
```

Listing 2:

```
00100 *MOUSE2/ASM    FILE NUMBER 2
00200
00300 TURNON   PSHS    CC              SAVE IRQ ENABLE FLAG
00400          ORCC    #$50            DISABLE IRQ CURSOR DRAW
00500          LDB     CSTAT,U         GET CURSOR STATUS
00600          ORB     #64             SET DRAW CURSOR FLAG
00700          STB     CSTAT,U         AND SAVE IT
00800          BSR     CURON           DRAW CURSOR IF NOT ALREADY ON
00900          PULS    PC,CC           TURN IN IRQ AND EXIT
01000
01100 CURON    LDB     CSTAT,U         IS CURSOR ON SCREEN ALREADY?
01200          BMI     CEXIT           SKIP IF SO
01300          BITB    #64             SHOULD CURSOR BE PLACED?
01400          BEQ     CEXIT           NO, THEN EXIT
01500
01600          PSHS    CC,U            SAVE BLOCK POINTER CPU STATUS
01700          ORCC    #$50            DISABLE IRQS
01800          ORB     #128            SET CURSOR STATUS TO SHOW
01900          STB     CSTAT,U         THAT CURSOR IS ON SCREEN
02000          LEAX    CURDAT,PCR      GET CURSOR SHAPE DATA
02100          LEAY    CURBUF,PCR      GET BUFFER FOR SAVE SCREEN UNDER IT
02200          LDD     YJOY,U          GET CURSOR POSITION
02300          SUBA    ,X+             UPDATE POSITION WITH HOT SPOT
02400          SUBB    ,X+             DATA FOR NEW POSITION
02500          CLR     FAST,U          RESET FAST FLAG TO CLIP DRAW
02600          CMPA    #192-16         IS THE FULL CURSOR ON THE SCREEN
02700          BHS     CURON0          SKIP IF PART OF Y OFF SCREEN
```

The Crossword Creator Contest

Can you create a totally symmetrical crossword puzzle using the *Word+* program and the specifications outlined in the accompanying article on Page 38 of the May 1986 issue of THE RAINBOW? If so, you may wish to enter The Crossword Creator Contest. And, if we choose to print your crossword puzzle, you will be awarded a special prize.

Send us a disk or cassette copy of the data file of your puzzle created by *Word+* along with a printed copy of the crossword puzzle — including the clues and answers. Be sure to put a title on the puzzle and if possible, follow a general interest theme.

Entries will be judged on the following criteria:

- Puzzle symmetry
- Number of words
- Spelling
- Creativity
- Thematic originality
- Understandability
- Ease of loading data
- Neatness
- Packaging

Enter as often as you like! Please note: We consider your act of entering the contest as consent to publish your creation.

The Crossword Creator Contest is open to all RAINBOW readers, advertisers and employees of Falsoft, Inc.

Send entries to:
Crossword Creator Contest
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The Falsoft Building
P.O. Box 385
Prospect, KY 40059

cursor drawing, fast and clipped.

The cursor is put down byte by byte rather than dot by dot to speed up the drawing. If only one image of the cursor was used, there would be only 32 positions across the screen. But the shape data has four-image offset (0,1,2,3) to give 128 positions. Of course, there are 192 positions up and down.

TURNOF (Line 28300) is the turn off cursor function (zero). This subroutine resets the cursor-enable bit and turns off the cursor.

CUROFF is used to remove the cursor if it is on the screen. The cursor is removed by getting the old screen data from CURBUF and putting it on the screen. As with the cursor draw there are two types of removes, fast and clipped.

DSABLE is the subroutine for function number six, disable (or unlink) *The Mouse*. After turning off the cursor, the old interrupt, output and command vector are restored.

SELJOY is for functions nine to 13, select joystick type.

BASIC's 60-hertz interrupt vector is passed through IRQ to move the cursor, poll the joystick and button status. First the status cursor and HOLD flag are tested along with the joystick position to see if it has moved. If the cursor should be removed, then CUROFF is called. Next, if the cursor should be turned on (because of a new position or hold is no longer on), then CURON is called.

Lines 37800 to 38100 call BASIC's old interrupt subroutine. The disk drive `MOTOROFF` and `TIMER` function will still work. Before end, the interrupt subroutine, the joystick and button status are polled.

At the end of Listing 1 are three +GET instructions that include the other files needed to assemble the program. This +GET of my assembler is very similar to the USE directive of the OS-9 assembler.

The FCC in lines 40900 to 41300 add the copyright text to the end of *The Mouse* program. ENDPRG is the length of the program.

Mouse 2 (Listing 3) is the joystick drivers used by *The Mouse*. The table of offsets called JOYTAB, is used by JOYSTK to call the right subroutine. Each polling subroutine updates the button up/down status flag (BUTDWN) and returns the Y-position (zero to 191) in the A register and the X-position (zero to 127) in the B register.

Next month we will look at *The Mouse* source code for the Hi-Res screen text driver in files four, five and six.

Editor's Note: Since this month's and next month's listings are intended for reference purposes, no addresses appear with the assembly language listings. The listings are available for downloading from the SOURCE FOR 6809 ASSEMBLERS topic area of the Delphi CoCo SIG database. ☐

Listing 1:

```
00100 *MOUSE/ASM   VERSION 2.0         LAST DATE 04/10/86
00200
00300 * THIS IS THE SOURCE CODE FOR MOUSE SOFTWARE ON A COLOR COMPUTER
00400 * COPYRIGHT 1986 BY SRB SOFTWARE, ALL RIGHTS RESERVED
00500 * THIS PROGRAM IS PLACED IN THE PUBLIC DOMAIN BY STEVE BJORK
00600 * FOR THE PRIVATE USE ONLY!
00700 * THIS CODE (ALL/PART) MAY NOT BE USED IN ANY MARKETED PRODUCT
00800 * WITHOUT WRITTEN CONSENT FROM SRB SOFTWARE.
00900 *
01000 * THIS PROGRAM WILL PLACE A CURSOR ON THE SCREEN AND MOVE IT EVERY
01100 * 1/60 OF SEC.
01200 * IS ALSO HAS A HI-RES SCREEN TEXT DRIVE.
01300
01400 SSTART  EQU     $BA     16 BIT POINTER TO START OF GRAPHIC SCREEN
01500 SEND    EQU     $B7     16 BIT POINTER TO END OF GRAPHIC SCREEN
01600
01700
01800         ORG     0       START OF PROGRAM
01900
02000 BEGPRO  LBRA    USR     VECTOR FOR USR FUNCTION
02100 CURDAT  RMB     16*3*2*4+2      SPACE FOR CURSOR DATA
02200
02300 * THIS TABLE IS USED TO SELECT WHAT FUNCTION TO DO
02400 COMTAB  FDB     TURNOF-COMTAB           0  CURSOR OFF
02500         FDB     TURNON-COMTAB           1  CURSOR ON
02600         FDB     GETX-COMTAB             2  GET X POSITION
02700         FDB     GETY-COMTAB             3  GET Y POSITION
02800         FDB     GETBUT-COMTAB           4  GET BUTTON PRESS
02900         FDB     GETDWN-COMTAB           5  GET BUTTON STATUS
03000         FDB     DSABLE-COMTAB           6  DISABLE IRQ FROM SYSTEM
03100         FDB     PING-COMTAB             7  BELL
03200         FDB     CLICK-COMTAB            8  CLICK SOUND
03300         FDB     SELJOY-COMTAB           9  SELECT RIGHT JOYSTICK
03400         FDB     SELJOY-COMTAB           10 SELECT LEFT JOYSTICK
03500         FDB     SELJOY-COMTAB           11 SELECT COCO MAX
03600         FDB     SELJOY-COMTAB           12 SELECT X-PAD
03700         FDB     SELJOY-COMTAB           13 SELECT HI-RES JOYSTICK
03800 LASTCM  EQU     (.-COMTAB)/2            NUMBER OF COMMANDS
03900
04000 * NEXT IS THE ALL THE VARIABLES NEEDED BY THE MOUSE SOFTWARE
04100 * VARIABLES ARE INDEXED OFF THE U REG FOR SPEED AND SMALLER SIZE
04200 DATA    EQU     .+16            -16 TO +15 ARE THE FASTEST!
04300 COUNT   EQU     .-DATA          MAKE ALL LABLES AS OFFSET TO U
04400         FCB     0               COUNT IS A COUNTER REG
04500 CSTAT   EQU     .-DATA          STATUS FLAG FOR CURSOR
04600         FCB     0
04700 YJOY    EQU     .-DATA          CURSOR Y POSITION
04800         FCB     0
04900 XJOY    EQU     .-DATA          CURSOR X POSITION
05000         FCB     0
05100 BUTDWN  EQU     .-DATA          BUTTON UP/DOWN
05200         FCB     0
05300 BUTTON  EQU     .-DATA          BUTTON BEEN PRESSED
05400         FCB     0
05500 BUTCNT  EQU     .-DATA          COUNTER FOR TEST BUTTON
05600         FCB     0
05700 STRIP   EQU     .-DATA          STRIP COUNT FOR DRAW CURSOR
05800         FCB     0
05900 MEMPOS  EQU     .-DATA          SCREEN POSITION OF CURSOR
06000         FDB     0
06100 FAST    EQU     .-DATA          FAST FLAG FOR DRAWING CURSOR
06200         FCB     0
06300 YCPOS   EQU     .-DATA          Y POSITION FOR PRINTING ON SCREEN
06400         FCB     0
06500 XCPOS   EQU     .-DATA          XPOSITION FOR PRINTING ON SCREEN
06600         FCB     0
06700 PMODE   EQU     .-DATA          WHAT PRINT MODE IS PROGRAM IN
06800         FCB     0
06900 INVERT  EQU     .-DATA          FLAG FOR INVERTED TEXT
07000         FCB     0
07100 JOYTYP  EQU     .-DATA          TYPE OF JOYSTICK INPUT (0-4)
07200         FCB     0
07300 HOLD    EQU     .-DATA          USE TO HOLD DRAWING CURSOR
07400         FCB     0
07500 OLDIRQ  EQU     .-DATA          PLACE TO PUT OLD IRQ VECTOR
07600         FDB     $FFFF
07700 OLDIO   EQU     .-DATA          PLACE TO PUT OLD OUTPUT VECTOR
07800         FDB     0
07900 NEWJOY  EQU     .-DATA          NEW X & Y FOR NEXT CURSOR POSITION
08000         FDB     0
08100 OLDCOM  EQU     .-DATA
08200         FDB     0
08300 OLDPRT  EQU     .-DATA
08400         FDB     0
08500 WDYPOS  EQU     .-DATA          SCROLL WINDOW Y POSITION
08600         FCB     0
08700 WDXPOS  EQU     .-DATA          SCROLL WINDOW X POSITION
08800         FCB     0
08900 WDYLEN  EQU     .-DATA          SCROLL WINDOW Y SIZE
09000         FCB     24
09100 WDXLEN  EQU     .-DATA          SCROLL WINDOW X SIZE
09200         FCB     32
09300 FLIP    EQU     .-DATA          FLAG FOR HI-RES JOYSTICK
09400         FCB     0
09500
09600 CURBUF  RMB     16*3+2          BUFFER FOR DATA UNDER CURSOR
09700
09800 COMBUF  RMB     $35*2           TABLE USED FOR HOOKING PRINT @
09900
10000 USR     PSHS    X               SAVE VARIABLE POINTER
10100         LEAX    >IRQ,PCR        GET MOUSE'S IRQ VECTOR
10200         CMPX    $10D            IS SYSTEM VECTOR THE SAME?
10300         PULS    X               RESTORE VARIABLE POINTER
10400         BEQ     USR1            SKIP VECTOR ARE THE SAME
10500
10600         PSHS    X,Y,U,D         ELSE SAVE ALL REGS
10700         LDD     $10D            GET OLD IRQ VERTOR
10800         LEAU    DATA,PCR        POINT TO VARIABLE BLOCK
10900         STD     OLDIRQ,U        AND SAVE IT
11000         LBSR    JOYSTK          GET CURSOR X & Y POSITION
11100         STD     YJOY,U          SAVE SET IT
11200         LEAX    IRQ,PCR         GET NEW IRQ VECTOR
11300         STX     $10D            AND SET SYSTEM VECTOR WITH IT
11400         LDD     $168            GET OUT VECTOR
11500         STD     OLDIO,U         AND SAVE IT
11600         LEAX    SPRINT,PCR      GET NEW OUT VECTOR
```

rick to use the full range of the 5-bit offset (-16 to 15) is to set the U register 16 bytes in the variable list. The value of the first variable is now -16 (previously zero), still in the 5-bit range. But now 16 more bytes (and a few more variables) can use the faster 5-bit offset.

Let's see how the first file (Mouse 1 — Listing 1) breaks down. The first 13 lines are the standard comments and copyrights. SSTART and SEND are constants for BASIC's screen pointer variables in direct page. SSTART holds the starting address of Hi-Res screen memory and SEND holds the ending address plus one.

The first instruction is a long branch over the program variable tables, data buffers and command offset vectors to the USR handling code. The next 386 bytes is the shape data for the Hi-Res cursor. By loading data over this space, a new cursor shape can be displayed.

COMTAB is a table vector offset for the 13 user functions. Each 16-bit entry in the table is an offset (how far way) from the start of the table to the address of the function.

Next is the variable list used by the program. The Data label is set up 16 bytes into the list for maximum use of the 5-bit offset.

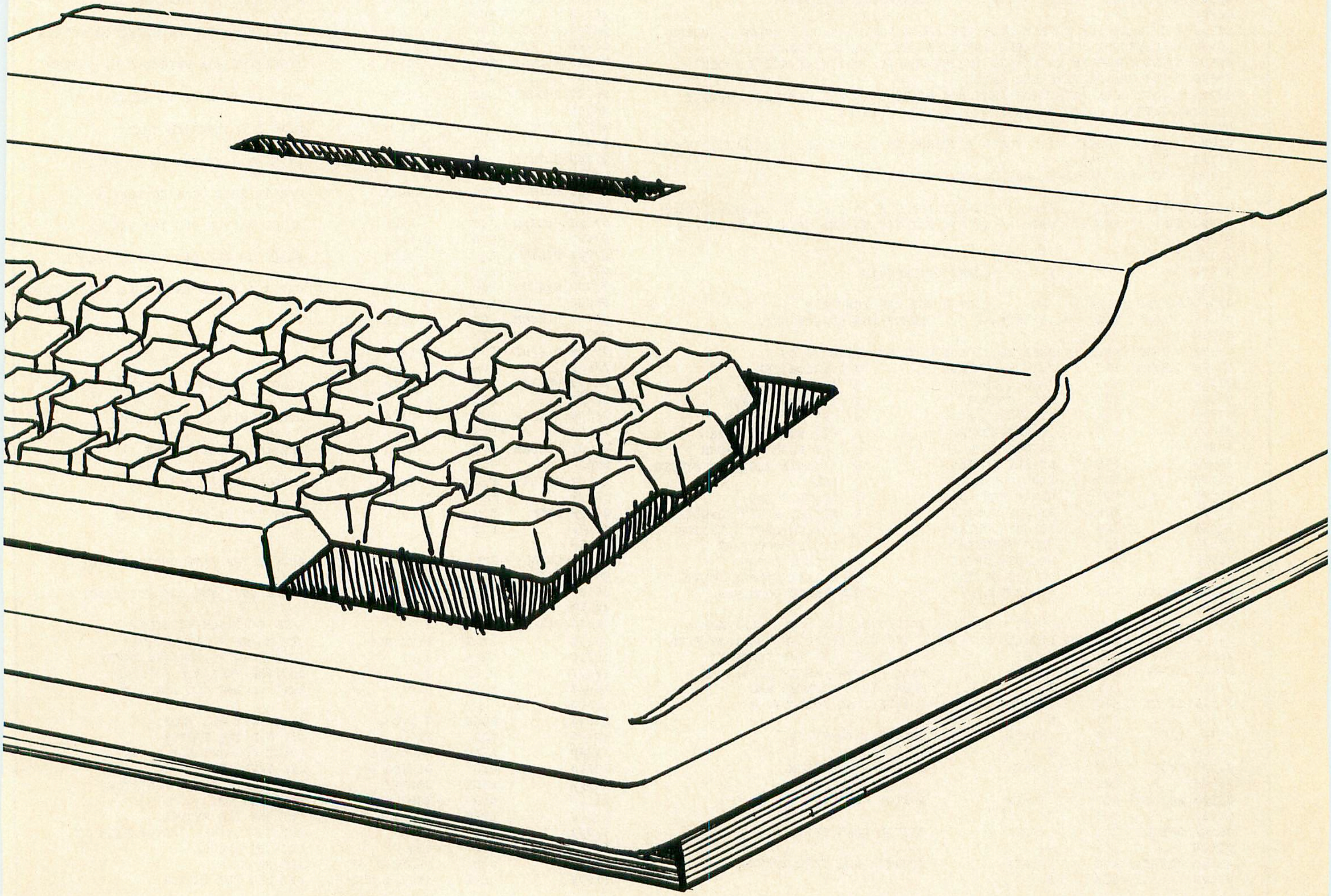
CURBUF is the buffer for saving what's on the screen before the cursor is placed. The cursor is removed by copying the old screen data from this buffer to the screen's memory. COMBUF is used as BASIC's command vector to intercept the '@' function in the PRINT command.

So much for the variables and buffers, now for code. First is the USR function and commands. The routine first checks to see if *The Mouse* is linked into BASIC's system. If needed, it hooks into the 60-hertz interrupt, output port and the PRINT command.

Down at the label USR1 (Line 13900) the program tests for a string variable and aborts if it is. After getting the function number, the program jumps to a subroutine based on it. When the program returns, the number is passed to BASIC and ends the USR function. The subroutines for USR functions two to four are in lines 15800 to 17100.

TURNON (Listing 2) is used to perform function 1, turn on the Hi-Res cursor. This subroutine sets the cursor-enable bit of the cursor-status flag byte and draws the cursor on the screen.

CURON is the code that does the drawing. After checking if it's OK to draw, it finds the screen's memory location for the cursor and determines if it should use the clip draw. A clip drawer only draws the part of the cursor that is on the screen. A clipper could be used even when it is not needed, but it is very slow, about seven times slower than the cursor draw without clipping. Because of this there are two types of



What's Inside a Mouse?

To refresh your memory, *The Mouse* is an assembly language program that displays and moves a cursor and prints upper- and lowercase text on the Hi-Res graphics screen. A BASIC program may access this interface by 13 user functions and the `PRINT` command.

This month we are going to dive into the assembly language source code and see just how *The Mouse* does its magic. Because *The Mouse* is about 35K bytes long, it is broken down into six files. We will talk about three of them this month. We will see the assembly language side of the `USR` function and `PRINT` command along with the code for drawing the cursor (pointer). Also, we will look at how the joystick and button information is polled.

Steve Bjork has been a programmer for over 15 years. In his association with Datasoft he has authored such programs as Zaxxon, Sands of Egypt *and* Mega-Bug. *He now handles product development for his own company, SRB Software, and has produced* Stellar Life Line, Ghana Bwana *and* PitFall II *among others. Steve lives in Simi Valley, California*

Before getting started I should remind you that *The Mouse* and its source code are copyrighted (1986) by SRB Software with all rights reserved. It is presented in RAINBOW magazine for private use only and cannot be used (all or part) in any marketed product without written consent from SRB Software.

A Few Points about Relative Code

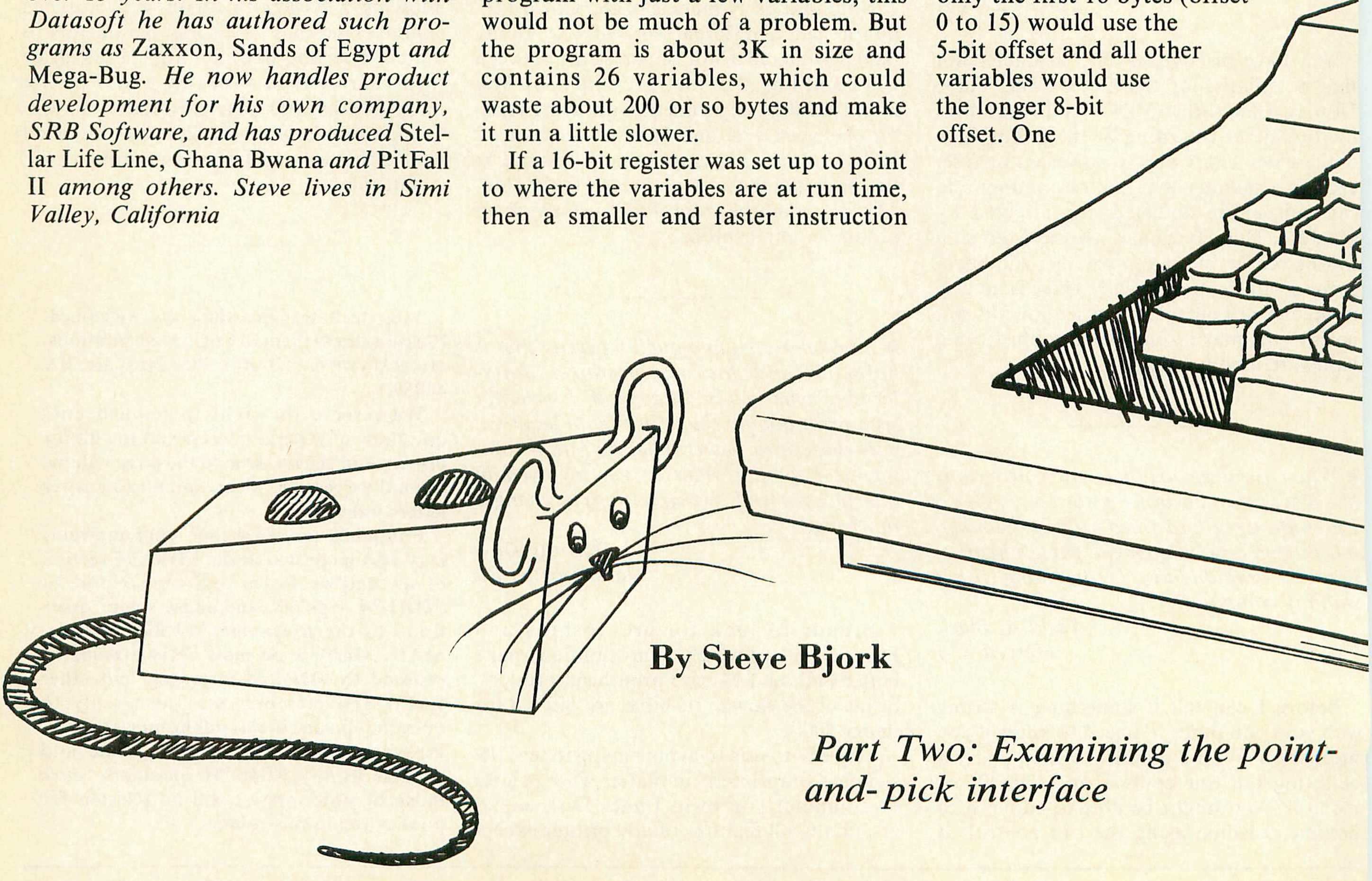
The Mouse is a code-relative program just like OS-9. The only difference is there is no direct page for the program (the direct page is already used by BASIC's system variables). The standard for address relative variables is LDA YJOY,PCR.

This instruction (when using a 16-bit offset) is about four bytes and nine clock cycles long, a little on the big and slow side. If *The Mouse* was a small program with just a few variables, this would not be much of a problem. But the program is about 3K in size and contains 26 variables, which could waste about 200 or so bytes and make it run a little slower.

If a 16-bit register was set up to point to where the variables are at run time, then a smaller and faster instruction could be used. In *The Mouse* the register (User stack pointer, but no used by BASIC as such) is pointed to th variable block. The previous exampl could be changed to LDA YJOY,U.

True, it does not look that different but it is only about 2 bytes and 5 cloc cycles long (about half the time an size). In *The Mouse* two types of offset are used, 5-bit and 8-bit. The 5-bit offse has an advantage over the 8-bit by bein one byte shorter and one clock cycl faster. But there is one problem with th 5-bit offset, its limited range of -16 t +15 from where the pointer is addressing. Any offset out of this range mus use an 8-bit offset, which is longer an slower. For this reason the most use variables are placed at the start of th variable table.

If the U register was just a pointer to the start of the variables list, only the first 16 bytes (offset 0 to 15) would use the 5-bit offset and all other variables would use the longer 8-bit offset. One



By Steve Bjork

Part Two: Examining the point-and-pick interface f you don't need graphics, type `PCLEAR1`. On a tape-based system you can type `POKE 25,6:NEW`.

Unless Brother has changed its design, hat 12-pin connector is not a standard serial port. You must send the signal from it to an additional optional $150 device sold by Brother, called the Brother IF 50 Interface. The IF 50 Interface plugs into the typewriter at one end with the required 12-pin plug, and at the other end provides a buffered (2K size) serial and parallel port (you select one by a switch on the IF 50).

On the DB-25 plug, which you will plug nto the IF 50 Interface, you must short pins 4, 6 and 8. Then, hook up that plug via a three-wire cable to the standard CoCo four-pin DIN connector in the following manner: Pin 3 of the CoCo DIN goes to Pin 7 of the DB-25 which will plug into the IF 50, Pin 4 of the CoCo DIN goes to Pin 3 of the DB-25 plug, and Pin 2 of the CoCo DIN goes to Pin 20 of the DB-25 connector. You will also have to properly set the Baud rate and word length, etc., on the IF 50 and the CoCo.

• *I noticed a peculiarity when writing a space game in* BASIC*'s* `PMODE 4`. *The blue ship I drew might be red the next time I turn on the computer or press the Reset button. Why is this? Is there any way to predict what color it will be?*

Jason France
Yuba City, CA

You have discovered the "artifact color flip" peculiarity of the CoCo. The Video Display Generator (VDG) chip initializes itself to either the rising or the falling edge of the video clock at any power up or reset cycle in a manner that is both random and can neither be detected nor affected by software. This determines whether your ship will be red or blue (and whether the background will be blue or red!). There is no way to predict or control which set you will get unless you make some very sophisticated hardware modifications.

• *When running artifact color programs like* Black Sanctum *and* Pitstop II, *my CoCo 2 presents a red and green artifact color set, not the red and blue set the game's instructions say I should have. Is something wrong with my computer?*

Todd A. Black
Merced, CA

Before I can tell if something is wrong with your computer, I'd need to know if you are using a TV or a monitor. Have you tried adjusting the tint control on your TV or monitor? You might be able to adjust it to become red-blue using the tint control. If not, you may have a problem in your TV, monitor, computer or, most likely if you are using one, your color video monitor driver circuit.

• *My Extended* BASIC *64K 'F' board computer loses all color when I press Reset. Replacing the VDG chip did not help. I damaged the "flying circuit" in the plastic tube while I was working on my computer. The colors I do get are now strange. This circuit is not shown in the schematic I have. Do you know the values of the components?*

Edwin J. Mullican
Gulfport, MS

The CoCo I 'F' Board is a particularly odd case, because Tandy went into production with a board that in most cases simply failed to produce artifact colors. They had to add a fix after production of the board; that is the thing you referred to as the "flying circuit."

The flying circuit consists of a 33K ohm resistor, a 27-micro henry inductor (choke) and a 75-pico farad capacitor all hooked in series, with one end connected to Pin 33 of the VDG (the video clock line) and the other connected to the composite video input to the Aztec RF Modulator. This point can also be found on the circuit board as the junction of R45 (470 ohms) and R45 (1.5K ohms). The video clock signal can also be picked up at one end of R37 (10K ohms).

Note that early models of the CoCo I 'F' board had a different sort of fix: Tandy merely soldered a 56K ohm resistor between Pin 2 and Pin 12 of the 1372 chip (U6). You might want to experiment with using resistors between 33K and 56K between pins 2 and 12 of the 1372 chip. In your testing, be sure to solder the resistor directly to the chip. The test won't be valid if you use any kind of jumper clip cables.

• *I am interested in a quality printer that is both fast and does not produce "dotty-looking" characters. In general, I have not seen print quality that I like from less than a 24-wire print head. What do you recommend? I do not want to get involved in interfaces or DIP switch settings or changes in wiring.*

Dorothy Dow
Jacksonville, FL

Brands to look for are Toshiba and Fujitsu, both of which, in my opinion, make better high-end 24-wire print head printers. Some of the slower Toshibas are offered for under $600.

There is no way to avoid having to set DIP switches on printers no matter what printer or computer you own. Under Disk BASIC, essentially all features of any printer except proportional spacing can be accessed using *Telewriter* or *VIP Writer*. Under OS-9, *Stylograph* allows use of proportional spacing options.

• *I own a Zenith 123A monochrome monitor and a Mark Data Products video driver. Both work well on my CoCo. The Zenith is rated at 640 by 200 dots resolution, or 15 MHz band width. I see other monitors comparably priced rated at 700 by 200 dots and 20 MHz. What is the best resolution the CoCo can handle? What do add-ons like the* Word-Pak RS *and the DISTO 80-column card do for the CoCo's resolution?*

Bill Condie
Freehold, NJ

All monochrome monitors have adequate resolution to display the CoCo's Hi-Res image of 256 by 192 pixels. Indeed, specifications such as dot resolution and megahertz band width are not good indicators in determining if one composite monitor is better than another. You simply must compare monitors with your own eyes.

Both the *Word-Pak RS* and the DISTO 80-column card have separate video signal creation hardware that produces a higher resolution video signal for display of text (only) in an 80-column by 25-line format. The DISTO card has the advantage of supporting underline and boldface display, and the *Word-Pak RS* has the advantage of allowing a hacker to tinker with both its character set and its display parameters to match it to odd-ball monitors. Both draw their characters in a roughly 5 by 7 matrix on a 640 by 200 pixel resolution screen. Compare this with the 256 by 192 pixel matrix that is the maximum a normal CoCo can display.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

For quicker response time, your questions may also be posted in the FORUM section of RAINBOW's CoCo SIG on Delphi. In FORUM, type `ADD` and address your questions to the username MARTYGOODMAN. Marty is on most every evening to respond to FORUM messages, and other CoCo SIG members may also reply to questions posted in this public message area. Please be sure to leave your name and address in any FORUM questions, since those of wide interest will be selected for publication in this column.

Introducing a new Rainbow column . . .

Remedies from the CoCo Clinic

By Marty Goodma

- *I would like to upgrade my old (gray) CoCo to display lowercase characters and would like to know what type of VDG is used. Is it a new standard IC, and if so, what is the type number, or is it a custom MC-6847 specially made for Tandy?*

J.P.Schreur
the Netherlands

I suggest you purchase one of the lower kit adaptors commercially available. These are boards that utilize the ability of the old 6847 to derive its character set from an external character generator EPROM. One is made by Green Mountain Micro of Roxbury, Vermont. It offers the advantage that you can reprogram the character generator EPROM with your own character set of choice.

- *I need to purchase a color monitor. While referencing ads in RAINBOW I see that some monitors do not have a Hi-Res dot-matrix of 255 by 192 dots. How could this affect the CoCo display if the monitor matrix is 300 by 300 dots, or 200 by 200 dots? Also, is there another VDG available for my CoCo that would change the Hi-Res dot-matrix from 255 by 192?*

Charles Stierhoff
Dallas, TX

Essentially, any make or model of composite color monitor will work fine on the CoCo. The ads that claim a given dot resolution merely refer to the maximum possible resolution the monitor can display. Thus, a monitor rated at 300 by 300 will nicely display the 256 by 192 CoCo Hi-Res screen. I do not believe there is a color monitor with resolution below 256 by 192.

- *I purchased a 16K standard BASIC CoCo 2 and upgraded it to 64K ECB myself. I [later] purchased a second CoCo 2 16K and when I went to upgrade it to 64K ECB I found the PC board had changed. The PC board we have is Revision F. When I talked with the Radio Shack Computer Center they told me this board is [difficult] and costly to upgrade — the price is $120. You can purchase a CoCo 2 64K ECB for about $150. The price to perform the upgrade does not make economic sense. Is there a solution?*

John Huth
SCS, MI

It would have helped if you had given the catalog number of the CoCo 2 you want to upgrade, but it sounds like an A or B model (number 26-3134A or 26-3134B). Inside this model are two (not eight) socketed RAM chips, usually flanked by two white single inline female connectors. Each of these chips (numbered 4416) has a total of 18 pins, not 16 like the RAM chips in older CoCos. They are found more or less in the center of the circuit board.

If your CoCo meets this descriptio
upgrading to 64K is both cheap and simpl
First, purchase two 4464 RAM chips. (The
are available from Microprocessors Unlin
ited of Beggs, Oklahoma, phone 918-26
4961, for roughly $4.50 per chip.) Remo
the two old 4416 chips and replace them wi
the 4464 chips. Look to the left and the fro
(toward the keyboard) from the area wi
the two RAM chips; you will spot tw
jumper solder pads enclosed in a whi
rectangular-like screen box drawn on th
circuit board, labeled either J4 or 64K c
both. Just connect those two points togethe
(using a short piece of wire and a low-powe
soldering iron) and your upgrade is com
plete.

- *When I turn on my Color Computer an*
ask for the amount of available memory,
returns about 22K (I have a 64K computer
What instruction do I give to obtain th
most amount of memory?

My typewriter is a Brother Compactron
60 and is computer-interfaceable. I hav
contacted the manufacturer and they indi
cate that it is fully compatible with the Colo
Computer. Unfortunately, its serial port ha
12 pins. Do you know where I can get a 12
pin male plug?

Anthony Depalm
Plainfield, N

The BASIC operating system of the CoC
was only designed to use 32K of RAM. T
use all 64K you need to write or buy appro-
priate machine language programs, or us
OS-9. Expanding available memory for us
with Disk BASIC is virtually impossibl
because of the machine setup and the wa
BASIC was written in the ROMs. However
to get the most memory on a disk system,

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. Marty is the database manager of RAINBOW's CoCo SIG on Delphi. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

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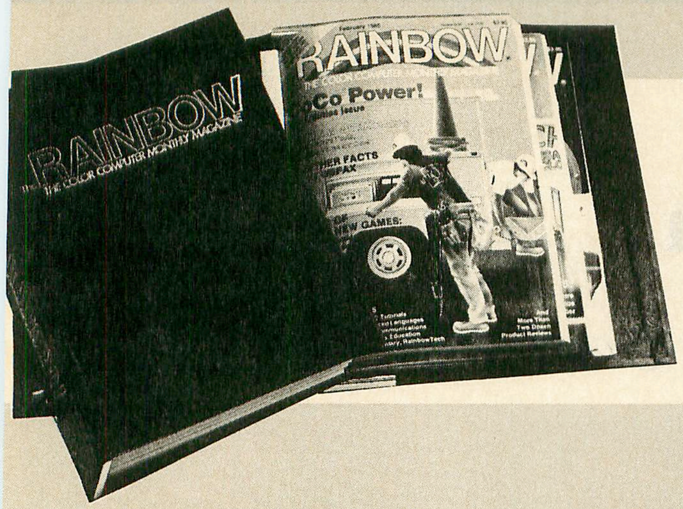

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For other inquiries call 502-228-4492.

chived polls, go to the Topics section of the SIG. Jim archives older polls to allow users to create even more polls. Only 20 polls can be active at any given time. To vote on an active poll, type `POLL` from the CoCo SIG prompt.

Jim has also been quite busy answering Mail and Forum messages, as well as weeding out older Forum messages that no longer have any information value. It appears we have found a quick way to correspond with other CoCo enthusiasts. For the newcomers to the CoCo SIG, we ask that certain guidelines be followed in sending messages. Questions and suggestions involving normal SIG operation should be sent to Jim Reed or me. This can be in either the Forum or via Mail, although we would like to see them in the Forum to keep them public. Questions about the database should be referred to **Marty Goodman** (MARTYGOODMAN) or **Steve Bjork** (6809ER). Any questions about the production of the RAINBOW should be sent to EDITORS and those concerning subscriptions should be sent to ORDERS. Any messages sent to EDITORS or ORDERS should be sent via the Mail section only, since they are not of general interest.

Free SIG Time!

We are pleased to announce the opening of a new section on our CoCo SIG. The section is titled Questions & Feedback and is accessible from the main CoCo SIG menu. Selections offered in this new section include Feedback to Sig Staff, Order RAINBOWfest Tickets, Request for Free Upload Time and Trouble Report.

The intent of the new section is to provide a quick method of obtaining help or services. To use this new feature just type `QUE` at the main CoCo SIG prompt. You will be presented with the menu of choices. Type the first three characters of the appropriate choice and then type `READ`. You will then be allowed to fill out a "form" that is simpler than typing your name. Just follow the prompts.

To Jim Reed goes a big chunk from that pot-o'-gold for all his perseverance (and late nights) working on getting this much-welcomed addition in operation!

Next Month

Next time I hope to continue our discussion of the database. Emphasis will be placed on uploading of files to our CoCo SIG.

ics world. Paul Normand has given us a curious *CHAIR-R-Us* program, and **Roger Bouchard** (HARBIE) has uploaded some striking animal images: in particular, a wildcat picture worth downloading and examining.

Ira Goldwyn (IRAG) recently arrived on the SIG with an immense number of graphics images. Most of these are cartoons or enhanced digitized pictures. His *Famous Faces* group includes W.C. Fields, Groucho Marx, Mr. Spock and (my favorite) Alfred E. Neuman. His *Looney Tunes* group includes Speedy, Tweety, Coyote, Elmer, Daffy and others of our friends. His cross-eyed *Mona Lisa* is an amusing bit of digitizer vandalism. I expect we'll be seeing more of Ira's material over the next few months.

In the Product News section I have uploaded a 15K piece that describes nearly all I know [Editor's exclamation!] about 80-column cards for the CoCo. This is an exhaustive comparative review of all four 80-column cards made for the CoCo, with material for the novice and dedicated hardware hacker alike. This review has already been more popular in terms of download count in its first two weeks of existence than most other reviews that have been there for months. I also have uploaded a comprehensive review of the new Tandy Modem Pak for the CoCo.

In the OS-9 database **Kent Florian** (DALEK) has given us the *Dolphin Editor*, a screen editor written in C. **Denny Skala** (DENNYSKALA) has provided a patch for function keys for Version 1.0 and Version 2.0. He has also given us an OS-9 driver for the J&R Banker 256/512K RAM upgrade. **Allan H. Smith** (LUTHER) has given us a driver for the Tandy Speech Sound Pak. (There are versions of this driver for both OS-9 Version 1.0 and Version 2.0.)

We have a number of new games. Paul Normand has provided us with three new entries: *Egyptian, Birdcreatures* and *Dicegame*. The first two are "U-Zap-Em" sorts of games. Steve Macri has given us *Drag.BAS*, a drag race game. Finally, one of the authors of *Graphicom* and *WEFAX* decided to doodle with his FORTH system, and, as a little exercise, whipped out a simple version of that classic computer game *Lunar Lander*. This is in compiled FORTH (it is downloaded and executed like any other binary program) and features very smooth graphics. A word of caution: This file is 27K long!

In the Music topic area, **Ken Bragg** (KILRCOCO) has submitted the first new music file we have seen in ages! The submission, *Open Arms*, is a darn good one.

The CoCo SIG staff heartily thanks all members for their contributions to the database.

A Look Back and a Look Forward

Our database has been steadily growing. The largest growth has been in the Graphics section, with the Utilities section close behind. Ira Goldwyn, a long-term CoCo BBS user, has amassed an immense library of Color Computer art, consisting of original art, cartoons and digitized pictures. He has contributed heavily to our Graphics database. Ira says he has over 2,000 CoCo art files in his library. I expect we'll be seeing quite a bit more from him. Soon, we expect to have the RAINBOW's "CoCo Gallery" pictures in the Graphics section, available to members without surcharge.

The labors of our new OS-9 section leader, Steve Bjork, are beginning to be felt in the OS-9 database. OS-9 files are now promptly enabled. Steve has worked closely with some of the more recent contributors to improve their files. Arrangements are now in progress for software from the OS-9 users group to start appearing in our OS-9 library. And the "KISSable OS-9" program files from RAINBOW will soon be available in the OS-9 Data Library section, though accessing those "KISSable OS-9" files will incur a $3.50 surcharge, as is the case with regular RAINBOW ON TAPE material. Members will be alerted to this by a dollar sign ($) in the filename.

Soon, I hope to find time to upload all of the *WEFAX* program material I have in my personal library, including a dozen or more graphics files of the documentation for *WEFAX*, hand-drawn by the authors of *WEFAX* and *Graphicom*. Coming from these same folks will be an RTTY program to allow amateur radio operators to receive and transmit RTTY signals using the CoCo, and a Morse Code practice program that incorporates all of the latest ideas about how to properly learn the code and improve speed. **Don Hutchison** (DONHUTCHISON) will soon be uploading some useful schematics and associated documentation for simple, rugged disk drive power supplies to the Hardware Hacking section. He and I have been working on these for the last few weeks, collaborating via Delphi Mail. I may also have time to upload some more font sets for *Graphicom*. I plan to write some new product reviews, including a comparison of all available 256K RAM disk upgrades for the CoCo, and a comprehensive product review of the new DS 69A video digitizer from Microworks, which is a most impressive product.

— Marty
(MARTYGOODMAN)
Delphi CoCo SIG Database Manager

Once you are in the file room and in ont of the appropriate file cabinet, rt opening the drawers to see what's ere. Just type `DIR` to get a directory the various groups. Make sure to jot wn any items you may want to download. When the directory has finished se CONTROL-'O' to abort the output), pe `READ XXXX` where "XXXX" is the me of the group of files you want to e. You *must* `READ` a group before you n download it.

What you should see now is a slew of formation about the group, such as e size, who submitted the files, what e files do and a list of the files in that oup. The last thing to appear on the reen is the `ACTION>` prompt. This is elphi's way of saying you can download or list the file now. If you press NTER at this prompt, the information out the next group in the directory is nt to your screen.

eady to Download

To initiate an XMODEM download, pe `XM`. You are prompted with:

`ype three consecutive <Control-`
`>'s to abort.`
`K, receive!` (text)

In this case, the file is an ASCII file s indicated by "text" in the above xample. If the file is binary, "text" is eplaced by "blocked." At this point nitiate XMODEM receive on your erminal program. On *Mikeyterm*, this s done by using CONTROL-'4'.

The file should begin transfer into our computer. When transfer is complete, your terminal program prompts ou. Save the file to tape or disk. It is vise to look at the contents of the buffer irst. If you can read each character in he buffer, the file should be saved as an SCII file. If, however, the buffer ontains what appears to be graphics haracters and other "garbage," the file s in binary (not necessarily machine-anguage) and should be saved accordngly.

To initiate an ASCII download, type `OW` at the `ACTION>` prompt. Delphi esponds with:

`eady... Press RETURN to begin:`

At this point, open the buffer on your communications software and press RETURN. As the file is transferred, you *will* see its contents scroll down the screen. Since binary files cannot be transferred in this manner, remember to save the file to tape or disk in ASCII.

Final Notes on Downloading

That's all there is to it! Once the file is saved, simply return to the communications mode and continue having fun. If the group from which you downloaded contains more than one file, you will probably want to get others, too. When you return to communications, Delphi will still be just "sitting" there. If you press ENTER, Delphi responds by starting a transfer of the next file in the group. If the group only contained one file, when you press ENTER, Delphi responds by sending the information for the next directory group to the screen. This is handy for downloading several consecutive files and groups.

If there is more than one file in a particular group, you don't have to download them all. If you only want to download the third file listed in the group, for example, just type `XM 3` or `DOW 3` accordingly at the `ACTION>` prompt.

To return to the database prompt for the database you are in, use CONTROL-'Z'. To change to a different topic area, type `SET XXX` where "XXX" is the first three letters of the database area you want.

If you have further questions, please direct them to Marty Goodman or me in Forum so that others may learn as well.

On Other Items

CoCo SIG Manager Jim Reed is busy archiving older polls. To see the ar-

Database Report

By Marty Goodman

In May, I uploaded a file to the General topic area describing the tragic loss of a GOES weather satellite because of a malfunction in its Delta booster rocket. Also present is a file on how to use DOT commands in messages to make them appear on the forum nicely formatted.

Steve Bjork (6809ER) has contributed a random number generator in assembly language source code to our Source For 6809 Assemblers topic area. Steve, one of the best known CoCo games programmers has, over the last year, been producing a lot of code he has been placing in the public domain. His excellent *Mouse* utilities have been appearing in the pages of RAINBOW over the last couple of months. I have uploaded to the Source For 6809 Assemblers area the source code file for the *MS19SET* format program that allows a CoCo to format MS-DOS type disks. This code is highly commented, and while written to create a single-sided MS-DOS disk, can easily be modified to generate double-sided MS-DOS format. **Art Flexser** (ARTFLEXSER), author of *ADOS* and *Peeper*, has continued to upload more of his tutorials to the Source code section. Among them is a tutorial on how to program the PIAs of the CoCo to read the keyboard and an introduction to ML sorting.

Our Utilities section has been expanding with new files from many members. **Mark Kowit** (TOBOR8) has uploaded *Real Estate Management and Evaluation* programs. **Jim Manning** (JIMBM) has uploaded a *Homebudget* program, and **Bill Lippert** (BEERBELLY) has given us a delete disk file utility. **Milton Webb** (MILTWEBB) contributed a disk utility program, and **Paul Normand** (PAULNORMAND) has provided a program for cataloging video tapes (*BETA.BAS*). **Chris Bergerson** (CHRISB) donated a *Disk Label Maker* utility.

In the Hardware Hacking topic area Steve Bjork has uploaded a utility for checking out the memory in a DISTO RAM Disk card. I've uploaded an article on how to upgrade all models of CoCo 2, and one discussing the use (and abuse) of high speed pokes on the CoCo. I also have uploaded a technical file for owners of the J&R Banker on how to fix the hardware so you'll never have to disable the unit to run any CoCo program. This hardware fix cures the unit's problem of not working with programs that talk to the SAM using CLR instructions. Finally, I have uploaded some alternate fonts for burning into 2716-1 EPROMs to improve the appearance of the character set of the PBJ *Wordpak-RS*. Included are utilities to create your own fonts.

In the Graphics database, there is a staggering number of new and lovely uploads. **Stephan Macri** (DRACMAN) has given us a utility to convert the output of the C64 Doodle converter into *CoCo Max* file format. Mark Kowitt has provided us with a beautiful enhanced digitized image from the movie *The Color Purple*: a striking silhouette of Celie. Mark has also given us a whole group of digitized faces entitled *Strange Faces*, which further establishes digitized images as a true art form. **Keith W. Smith** (UGLY) has provided us with a poster showing some of *Murphy's Laws*, and **Loren J. Howell** (XENOS) has given us a CGP-115 dump program. Loren has also uploaded two pictures of butterflies, one of a Monarch and one of a Cyrus Morphus. I am impressed with the detail and accuracy of these images, and with their sheer beauty. Loren appears to be a budding Audubon of the CoCo graph-

Using the CoCo SIG

By Cray Augsbur
Rainbow's CoCo SIGo
User Name: RAINBOWMA

Let's take a trek into the workings of the database on the CoCo SIG, and while we're on this voyage, we'll look in detail at how to download and upload files while on Delphi. However, we first need to become more familiar with the fundamentals.

File Formats

A file is a group of related characters and symbols. Generally the term "file" refers to a program, an article or a set of data. There are two different formats for the storage of information in files: ASCII and binary. Binary files are sometimes referred to as compressed or tokenized. An ASCII file contains readable characters, while a binary file contains characters that represent the zeroes and ones the computer works with.

ASCII is the preferred format for text files or articles. It is sometimes best to store BASIC programs in the ASCII format. Incidentally, we request all BASIC files for uploading be stored in ASCII. Binary is used for the storage of tokenized BASIC files, machine language programs, graphics and music files. Infrequently, text files are stored in binary format.

File Transfers

There are two distinct methods of uploading and downloading files. These are the ASCII transfer method and XMODEM transfer. While the ASCII transfer can only be used to transfer ASCII files, XMODEM can be used to transfer both ASCII and binary files.

ASCII transfer is simply the transmission or reception of a character-by-character image of a file. Since the ASCII code uses only the lowest-order seven bits of each byte, control codes and other special information (binary code) cannot be transmitted in this way. ASCII transfer involves no automatic error detection, so it is frequently unreliable for the transfer of information.

The XMODEM protocol transfers complete bytes and, therefore, allows the transfer of binary information and control codes. When a file is being transferred via XMODEM from a host computer to a remote computer, the information is sent in groups (blocks) of 128 bytes rather than a continuous stream. This allows for error detection in the transfer.

Once a block is transferred, the host computes a checksum value based on the information contained in the block. The remote computer also does this, and sends the value back to the host. The host compares the computed values and, if they are the same, transfers the next block in the file. If the values do not match, the host knows the sent block was not correct and resends the block. Most XMODEM terminal programs allow the host to send a correct block up to 10 times, if necessary. This allows for the transfer of error-free ASCII or binary files. It is for these reasons we suggest you use a terminal program that includes XMODEM capability. If you do not have access to one, you can download *Mikeyterm* from the data communications database via ASCII transfer. *Mikeyterm* is an easy-to-use XMODEM terminal program that supports several system configurations including tape-based systems.

Database Organization

The CoCo SIG database can be viewed as a room full of file cabine There are 16 file cabinets; one for ea topic area of the database. Each cabir contains several drawers (we call the groups on Delphi.) Each drawer c have one or more folders (files, programs) in it.

Type `DAT` to get the database for t CoCo SIG. You will see a `TOPI` prompt; enter the name of the topic ar you want to peruse (see Table 1.) R member, Delphi allows you to enter t first few unique characters in place the entire name. A shorter method is include the topic name on the comman line with `DAT`. For instance, at the Co SIG prompt type `DAT GAM` to enter t games database.

Cray Augsburg is RAINBOW's technical assistant and has an associate's degree in electrical engineering. He and his wife, Ruth Ann, have two children and live in Louisville, Kentucky. His username on Delphi is RAINBOWMAG.

Table 1

Topic Areas of the CoCo SIG Database

1) General Information
2) Info on RAINBOW
3) BASIC Programming
4) OS-9
5) Source For 6809 Assemblers
6) Help
7) Utilities & Applications
8) Product Reviews & Announcements
9) Hardware Hacking
10) RAINBOW ON TAPE
11) Games
12) Data Communications
13) Graphics
14) Managers Only*
15) Music & Sound
16) Preview*

* These areas are accessible only by SIG staff. Managers Only is used for the storage of suggestions by the staff. Preview is the area where new submissions wait before they are moved into the public areas.

```
590 IFX$="@"THEN770
595 X=ASC(X$)-64:IFX<1 OR X>PC T
HEN585
600 IFK(X)=1THEN615
605 PRINT:PRINT" SORRY, BUT IT I
S";Z$;:NW=NW+1
610 GOTO620
615 PRINT:PRINT" YES! THE ANSWER
 IS"Z$;:NC=NC+1
620 NT=NT+1:IF NT<10THEN630
625 GOSUB785:NT=1
630 X$=INKEY$:IFX$=""THEN630
635 IFX$="@"THEN770
640 IFX$=CHR$(13)THEN370
645 GOTO630
650 CLS:PRINT:PRINT" HOW WOULD Y
OU WRITE OUT THE     FOLLOWING D
IGIT ?"
655 PRINT:PRINT"    => ";Z$
660 TM$=R$:TX=RND(2):IFTX=2THEN6
70
665 D$(1)="A) "+R$:D$(2)="B) "+A
L$:AN$="A":GOTO675
670 D$(2)="B) "+R$:D$(1)="A) "+A
L$:AN$="B"
675 GOSUB680:GOTO725
680 PRINT:FORY=1TO2:R$=D$(Y)
685 T=LEN(R$):IF T<=30THEN710
690 FORI=30TO0STEP-1:IFMID$(R$,I
,1)=" "THEN705
695 IFMID$(R$,I,1)="-"THEN705
700 NEXTI:GOTO710
705 L$=" "+LEFT$(R$,I):R$=RIGHT$
(R$,T-I):PRINTL$:GOTO685
710 PRINT" "R$
715 IFY=2THENRETURN
720 PRINT:NEXTY
725 X$=INKEY$:IFX$="A"THEN745
730 IFX$="B"THEN745
735 IFX$="@"THEN770
740 GOTO725
745 PRINT@160,"";:FORI=1TO320:PR
INT" ";:NEXT:PRINT@192,"";
750 IFX$=AN$THENPRINT" CORRECT!
THE ANSWER IS:":NC=NC+1
755 IFX$<>AN$THENPRINT" SORRY! T
HE ANSWER IS:":NW=NW+1
760 D$(1)=TM$:D$(2)="":GOSUB680
765 GOTO620
770 CLS:PRINT@101,"YOU TRIED"NC+
NW"PROBLEMS &":PRINT@165,"ANSWER
ED"NC"CORRECTLY"
775 PRINT@229,"WHILE DOING"NW"WR
ONG."
780 GOSUB785:GOTO825
785 NQ=NC+NW:IF NQ=0THEN NQ=1
790 MS=INT(NC/NQ*100)
795 IF MS<70 THEN RR=RR-1
800 IF RR<0 THEN RR=1
805 IF MS>95 THEN RR=RR+1
810 IF RR>5 THEN RR=5
815 ON RR GOSUB155,160,165,170,1
75
820 RETURN
825 PRINT@293,"YOUR SCORE IS"MS"
%."
830 PRINT@357,"ANOTHER TRY (Y/N/
C) ?";
835 X$=INKEY$:IFX$="Y"THEN RUN
840 IFX$="N"THENCLS:END
845 IFX$="C"THEN370
850 GOTO835
```

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```
$):L$=L$+A$(P)
340 RETURN
345 W=LEN(Z$):FORI=1TOW:IFMID$(Z
$,I,1)="."THEN355
350 NEXTI
355 D$=LEFT$(Z$,I):E$=RIGHT$(Z$,
W-I):A=VAL(D$):GOSUB265:R$=L$+"A
ND ":Q=LEN(E$):A=VAL(E$):GOSUB26
5:AL$=R$+L$+C$(Q+1):R$=R$+L$+C$(
Q):L$=""
360 IF LEFT$(R$,9)="ZERO AND "TH
EN R$=RIGHT$(R$,LEN(R$)-9)
365 RETURN
370 CLS:F=RND(G):L=RND(H)
375 Q$=" ":PQ$="":IF F=0THEN405
380 FORY=1TO F:K=RND(10)-1:IF K=
0 AND F=1 THEN K=1
385 K$=STR$(K):K$=RIGHT$(K$,1):Q
$=Q$+K$:NEXTY
390 IF VAL(Q$)=0 THEN370
395 IF VAL(LEFT$(Q$,2))=0 THEN37
0
400 IF L=0 THEN430
405 Q$=Q$+".":FORY=1TO L-1:K=RND
(10)-1:IFK<4THEN K=0:GOTO415
410 K=RND(10)-1
415 K$=STR$(K):K$=RIGHT$(K$,1):P
Q$=PQ$+K$:NEXTY
420 K=RND(9):K$=STR$(K):K$=RIGHT
$(K$,1):PQ$=PQ$+K$
425 Z$=Q$+PQ$:GOSUB345
430 IF DM=2THEN650
435 CLS
440 IF DM=0THEN455
445 PRINT:PRINT" ENTER A DIGIT W
HICH REPRESENTS  THE FOLLOWING W
RITTEN NUMBER.":PRINT
450 GOTO460
455 CLS:PRINT:PRINT" WHICH DIGIT
BELOW REPRESENTS    THE FOLLOWI
NG WRITTEN NUMBER ?":PRINT
460 T=LEN(R$):IF T<=30THEN485
465 FORI=30TO0STEP-1:IFMID$(R$,I
,1)=" "THEN480
470 IFMID$(R$,I,1)="-"THEN480
475 NEXTI:GOTO485
480 L$=" "+LEFT$(R$,I):R$=RIGHT$
(R$,T-I):PRINTL$:GOTO460
485 PRINT" "R$
490 IF DM=0THEN510
495 PRINT:PRINT"      => ";:LINEIN
PUTZZ$
500 IF VAL(ZZ$)=VAL(Z$)THEN615
505 GOTO605
510 P(1)=VAL(Z$):P(4)=P(1)*10:P(
3)=P(1)*10/100
515 V=P(1)-INT(P(1)):V=V*10/100:
P(2)=INT(P(1))+V
520 IF LEFT$(PQ$,1)<>"0"THEN530
525 TT=LEN(PQ$):QT$=RIGHT$(PQ$,T
T-1):QL$=Q$+QT$:P(2)=VAL(QL$)
530 P$(1)=Z$:FORI=2TO4:P$(I)=STR
$(P(I)):NEXT:P$(5)=P$(1)+"0"
535 FORY=1TO PC:IF RIGHT$(P$(Y),
3)<>"001"THEN550
540 RT=LEN(P$(Y))-1:FORJ=RT TO 1
STEP-1:IF MID$(P$(Y),J,1)="0"THE
NNEXTJ
545 P$(Y)=LEFT$(P$(Y),J)
550 NEXTY
555 FORY=1TO PC
560 K=RND(PC):IF L(K)=1THEN560
565 L(K)=1: K(Y)=K:NEXT
570 FORI=1TO5:L(I)=0:NEXTI
575 PRINT
580 FORI=1TO PC:PRINTTAB(6);CHR$
(64+I);") ";P$(K(I)):NEXT
585 X$=INKEY$:IFX$=""THEN585
```

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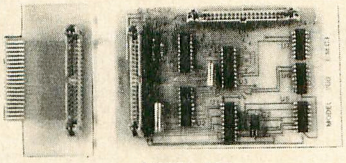
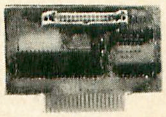
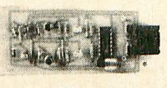
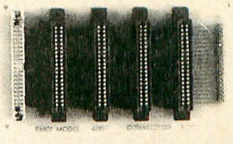

MODEL 200


MODEL 100


MODEL 500


MODEL 400

```
175 G=4:H=4:PC=5:RETURN
180 PRINT@453," (D)IGIT OR (W)RI
TTEN ";
185 X$=INKEY$:IFX$="D"THEN200
190 IFX$="W"THEN DM=2:GOTO235
195 GOTO185
200 PRINT@453," (S)ELECT OR (I)N
PUT  ";
205 X$=INKEY$:IFX$="S"THEN220
210 IFX$="I"THEN225
215 GOTO205
220 DM=0:GOTO230
225 DM=1
230 CLS
235 K=RND(-TIMER)
240 DATAONE,TWO,THREE,FOUR,FIVE,
SIX,SEVEN,EIGHT,NINE,TEN,ELEVEN,
TWELVE,THIRTEEN,FOURTEEN,FIFTEEN
,SIXTEEN,SEVENTEEN,EIGHTEEN,NINE
TEEN,TWENTY,THIRTY,FORTY,FIFTY,S
IXTY
245 DATASEVENTY,EIGHTY,NINETY,HU
NDRED,THOUSAND,TENTHS,HUNDRETHS,
THOUSANDTHS,TEN-THOUSANDTHS,HUND
RED-THOUSANDTHS
250 FORI=1TO19:READA$:A$(I)=A$+"
 ":NEXT:FORI=2TO9:READA$:B$(I)=A
$+" ":NEXT:READH$,TH$:H$=H$+" ":
TH$=TH$+" ":A$(20)=B$(2)
255 FORI=1TO5:READC$(I):NEXT
260 GOTO370
265 L$=""
270 IFA=0THENL$="ZERO ":GOTO340
275 N$=STR$(A):W=LEN(N$):N$=RIGH
T$(N$,W-1):W=W-1
280 ON W GOTO320,320,305,300
285 P$=LEFT$(N$,2):P=VAL(P$):IFP
>20 THEN295
290 L$=L$+A$(P)+TH$:W=3:N$=RIGHT
$(N$,3):GOTO305
295 P$=LEFT$(N$,1):P=VAL(P$):L$=
L$+B$(P):P$=MID$(N$,2,1):P=VAL(P
$):L$=L$+A$(P)+TH$:N$=RIGHT$(N$,
3):GOTO305
300 P$=LEFT$(N$,1):P=VAL(P$):L$=
L$+A$(P)+TH$:N$=RIGHT$(N$,3):W=3
305 P$=LEFT$(N$,1):P=VAL(P$):IF
P=0THEN315
310 L$=L$+A$(P)+H$
315 W=LEN(N$):N$=RIGHT$(N$,W-1)
320 P$=RIGHT$(N$,2):P=VAL(P$):IF
P>20 THEN335
325 L$=L$+A$(P)
330 GOTO340
335 P$=LEFT$(N$,1):P=VAL(P$):L$=
L$+B$(P):P$=RIGHT$(N$,1):P=VAL(P
```

ADOS ENHANCED, EPROM-ABLE DISK BASIC

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must enter the correct digit number to get a correct response. Keep in mind that the number entered must not have any commas in it. After a response has been given, you may press '@' for the score, but not during the input part. Otherwise, the '@' symbol is interpreted as an incorrect response.

When you finally go to the score card, either press 'C' to continue, 'Y' to run the program again, or 'N' to end the program.

The program should fit easily into a 16K CoCo, but if you have any doubts, `PCLEAR1` first. You could also include the speed-up `POKE` as one of the lines, but quite honestly, the program runs rapidly enough as it is.

A Few Words About Title Maker

I have gotten letters from a few people who have had difficulty with the CoCo *Title Maker* from several months ago. While I don't have the time for individual replies, this should cover most of the concerns.

First, some have written and asked if there were any mistakes in the listing. No, the listing is without error. Some of you may have made typing errors when keying it in. When in doubt, subscribe to RAINBOW ON TAPE.

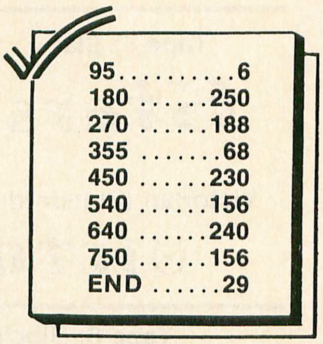
Some have said they get a ?DS error when trying to reload the BASIC program created by *Title Maker*. This happens only if you have left out a semicolon somewhere in the original listing. Recheck your typing. If that doesn't work, you could always load the new BASIC program into a word processor like *Color Scripsit*. First try loading the program into BASIC. If you get the ?DS error, it means you have a direct statement without a line number. List what has loaded to see in what line the problem appears. Then load the BASIC program into the word processor, and remerge the lines where this error occurs. Save the result and then relo
into BASIC.

Others say they have gotten the ?F
error when trying to load the new BAS
program from disk. This only happe
if you analyze the screen and then sa
the screen to disk in machine languag
What happens is that the machi
language screen is saved with a `/BF`
extension. Use `RENAME` to give th
machine language listing a `/BIN` exte
sion, reload it into the *Title Maker*, a
then analyze it to disk. This should sol
this very rare quirk.

As a rule of thumb, it is better to sa
first, and then analyze second.

Conclusion

I hope this fourth installment in t
Life Skills series proves valuable to yo
whether you are a teacher or ha
youngsters in the family. Keep thinki
up those ideas, and I'll see what I ca
come up with. See you next month.



95	6
180	250
270	188
355	68
450	230
540	156
640	240
750	156
END	29

The listing: `LIFESKL4`

```
10 REM****************************
15 REM* LIFE SKILLS MATH DRILL *
20 REM*   WRITTEN  NUMBERS      *
25 REM*   BY FRED B.SCERBO      *
30 REM*    60 HARDING AVE       *
35 REM*  NORTH ADAMS,MA 01247   *
40 REM*   COPYRIGHT (C) 1986    *
45 REM****************************
50 CLEAR800:DIMA$(20),B$(9),C$(5
),P(5),P$(5),K(5),L(5),D$(2)
55 CLS0:FORI=1TO32:PRINTCHR$(188
);:NEXT
60 FORI=1TO192:READA:IFA=0THENA=
16
65 PRINTCHR$(A+128);:NEXT
70 FORI=1TO32:PRINTCHR$(179);:NE
XT
75 DATA125,120,80,125,120,116,12
6,124,122,125,124,125,,,30,28,26
,29,,16,30,20,30,20,30,16,20,30,
,21,28,29
80 DATA117,,,117,,,122,80,120,11
7,,116,112,,26,,24,21,,22,16,,26
,,26,,,26,,21,,20
85 DATA117,,,117,,,123,122,80,,11
7,115,114,,,27,19,18,21,22,,,,26
,,26,,,26,,21,19,19
90 DATA117,,,117,,,122,120,,117,
112,,,,,,26,21,20,18,,,26,,26,,,
26,,,,21
95 DATA117,,122,117,,,122,,,117,
,113,,,26,,26,21,16,20,18,,26,,2
6,21,,26,21,21,,21
100 DATA119,115,122,119,114,113,
123,112,,119,115,119,,,27,19,26,
23,18,,27,17,27,17,27,23,17,27,2
3,21,19,23
105 PRINT@293,"  COMPUTER MATHDR
ILL  ";
110 PRINT@325,"   WRITTEN  NUMBE
RS   ";
115 PRINT@357,"   BY FRED B.SCER
BO   ";
120 PRINT@389,"  COPYRIGHT (C) 1
986  ";
125 PRINT@453,"  SKILL LEVEL  (1
-5)  ";
130 X$=INKEY$:IFX$=""THEN130
135 RR=VAL(X$):IFRR<1THEN130
140 IF RR>5THEN130
145 ON RR GOSUB155,160,165,170,1
75
150 GOTO180
155 G=2:H=1:PC=2:RETURN
160 G=2:H=2:PC=3:RETURN
165 G=3:H=3:PC=3:RETURN
170 G=3:H=4:PC=4:RETURN
```

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Tape 2: Broadway/Old Style

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Tape 3: Business/Antique

Business Antique

*These disks of additional typestyles are available for **$49.95** each.*

Disk 1 - all type styles on Tapes 1, 2 and 3.
Disk 2 - all type styles on Tapes 4, 5 and 6.

Tape 4: Wild West/Checkers

Wild West Checkers

Tape 5: Star **Hebrew**

Stars שלום

Victorian (Standard and Reverse only)

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Tape 6: Block/Computer

Block
COMPUTER

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*These disks of additional typestyles are available for **$49.95** each.* They are not compatible with the **CoCo Calligrapher** typestyles or program. OS-9 typestyle disk must be used with the **OS-9 Calligrapher.**

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level of the material if the work presented is either too easy or too difficult for the user.

To make this program more adaptable, I have limited the BASIC keywords to only those found in 16K Color BASIC. I have also intentionally left out any keywords which are not found in the MC-10 Color BASIC language such as `ELSE` or `STRING$`. MC-10 users should change the value in Line 235 (`235 K=RND(-TIMER)`) to `235 K=RND(-9999)` or some other number. You may want to insert this value in the middle of Line 185, too, if you want to make the program truly random on the MC-10.

The first task I encountered in creating this program was to write an algorithm (set of program commands) to take a number and translate it to its written form. This requires storing the names of the numbers in string arrays and combining them to create the correct written equivalent.

Naturally, we can't store all the possible written numbers; our program would be gigantic. We want to store only those root parts to be combined as needed. For example, we don't save a string as sixty-three but combine the strings for sixty and three to form our answer. Therefore, the `DATA` statements contain all our possible written roots.

The next trick is to devise a way to create multiple-choice answers for a randomly generated number. However, since we need to deal with our numbers in their string form, a strange bug in BASIC caused me many hours of head scratching. It seems that every now and then, if we are dealing with `STR$` and the `VAL(X$)` commands, BASIC decides to add a useless decimal tail to our number. Therefore, our string number of 23.56 may end up appearing as the mutant form 23.560001 when displayed on the screen. This causes great confusion to our user, so I had to find a way to chop off this tail whenever it appears.

After some trial and error, I was able to come across a set of lines to do just that. You may notice that the commands to create and analyze the numbers and strings are longer than necessary and may cover circumstances which our random numbers may not require. This was necessary in order to make the algorithm work.

These lines soon expanded into a full-blown program of 170 program lines. Funny how a simple idea can be expanded to such a degree. These are the steps we must take, however, in order to cover all the circumstances we want our program to deal with.

The earliest version of this listing incorporated this CPL concept only if the student checked his progress. Since my recent programs have allowed the user to check progress, then continue, I have found many students will check their progress every two minutes. I felt this would be a way to discourage that practice by having the difficulty level increase if the score was above 95 percent, or decrease if it was lower than 70 percent.

"The program will vary the skill level to match the student's ability."

This did not prove suitable in cases where the student did not check the progress by pushing the '@' key. Therefore I included a routine to check the progress, without displaying it, every ten problems. If you want to change the minimum and maximum scores which trigger the change, alter the values of 70 and 95 in lines 795 and 805. The variable 'MS' stands for the Math Score for the program at that point.

The result of these line changes is that the student can be using the program, reviewing the material, and the program will vary the skill level to match the student's ability. Thus, if a student is left on autopilot, (which I do not advise), there is less likelihood of wasting time on unsuitable material.

If our program generates a number to be identified and has to create multiple choice answers, it usually generates them by moving the decimal place to the left or right. Some students noticed a pattern in my earliest version so I later included commands to break this pattern. Therefore, if a zero appears in the tenths place, one of the multiple choice answers will extract the zero. This allows us a truly random creation of multiple choice responses. This extraction occurs in about half of our cases.

One option I have avoided is having the user enter a written number to match a number in digits. This would cause great confusion as the user might include an extra space or misspell one of the root words. For example, if an answer is one hundred and twenty-on hundreths, but was entered as one hundred and twenty one hundreths, i would be marked as incorrect. This onl frustrates our student.

Recently I was presenting some of m earlier educational programs to a grou of teachers in a private school when on of them expressed concern over m program's use of the word Wrong whe an incorrect answer was used. Sh asked, "Couldn't you say Sorry instea of Wrong? Wrong sounds so negative. Therefore, I have started using Sorr when an incorrect answer is entered.

Using the Program

On running the program, our Lif Skills title card appears. I have tried t use a different color scheme with eac one. You are asked to select a skill leve from one to five with one being th easiest level. If a higher level is selected it continues to select problems from a easier level as well in order to allow fo greater variety of selections.

Your next choice is digit or written.

Choosing 'W' displays a number that must be idenitified from the two choices listed below it. For example:

```
HOW WOULD YOU WRITE OUT THE
FOLLOWING DIGIT ?
   72.41
A) SEVENTY TWO AND FORTY ONE
THOUSANDTHS
B) SEVENTY TWO AND FORTY ONE
HUNDRETHS
```

The user must press either 'A' or 'B' to respond. Pressing '@' gives the user a score card.

If 'D' is selected for digit, then there are two possible choices, either select or input.

The Select mode offers multiple choice digit answers to a written number. There may be anywhere from two to five multiple choice responses displayed, depending on the difficulty of the material. Pressing '@' gives the score card.

If you choose the Input mode, then a written number is displayed. The user

WISHING WELL

16K
ECB

Computer-Paced Learning

By Fred Scerbo
Rainbow Contributing Editor

Editor's Note: If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget that this is* BASIC. *All programs resulting from your wishes are for your use but remain the property of the author.*

As time passes, and more and more programs are written for our Tandy computers, software authors discover new uses for the BASIC language burned into the chips of our machine's ROM. This month's "Wishing Well" offering is no exception as we will introduce a new concept to our pages: CPL or Computer Paced Learning. This is done with our fourth Life Skills program titled *Written Numbers.*

The Wish: What is CPL?

More classrooms now have computer terminals in them. Teachers across the country have purchased millions of dollars of software and have quite often been cheated out of their school district's limited financial resources. There have been two very serious drawbacks to this development.

First, some school districts have joined in a game of one-upmanship by comparing expenditures on computers and software as if they were comparing new cars. This type of attitude can have a very negative impact on the goals of any computer program. What is needed is software geared to specific needs.

The second error that occurs is the tendency to put students on "autopilot" once appropriate software is found. Some students will gladly work on a program covering material too easy for their ability. Unless the student's level and progress are closely monitored, the student will drift off, running like a plane on autopilot, oblivious to all real learning.

Since we have a CPU (Central Processing Unit) in our machine capable of executing any logical command set given it, we can develop, with a little care, software which just might help us deal with these two problems. That's where the concept of CPL or Computer Paced Learning comes in. Our goal is to have our software actually monitor the student's progress during the running of the program and make adjustments in skill level based on that student's performance.

The Program: *Written Numbers*

Our first Life Skills program was a simulation that dealt with money handling skills and subtraction. Our second program was *Number Evaluation* in which the place value of numbers was examined. Program three dealt with *Ruler Reading Skills.* In *Written Numbers,* however, we return to the math skills originally introduced in *Number Evaluation.* Rather than identify the place in a number as was done in that program, this time we want to evaluate a number such as 55,697.25 and translate it to its written form of fifty-five thousand six hundred ninety-seven and twenty-five hundreths.

The first requirement of the program is that it have a variable skill level which can be selected from a menu. Next, it must deal with an evaluation of the numbers in both written and digit form. Third, it must allow for periodic checking of student score and progress. Finally, it must adjust the difficulty

---

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

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The Editor in EDT/ASM 64D is the most powerfull, easy to use Text Editor available in any Editor/Assembler package for the Color Computer. It even has automatic line number generation for easy entry of program material. Some of it's features include:

- Local and Global string search and/or replace.
- Full screen line editing with immediate line update.
- Easy to use Single keystroke editing commands.
- Load & Save standard ASCII formatted Tape/Disk files.
- Move or Copy single & multiple text lines.
- Create and Edit disk files larger than memory.
- Hi-Res Text Display 28 to 85 columns by 24 lines.
- Supports the PBJ 80 Column cards Word-Pak I & II.

The Assembler portion of EDT/ASM 64D is the part that creates the Machine Language program. It processes the source file(s) created or edited by the text editor and creates a LOADM or CLOADM binary file on either Disk or Tape. Using library files you can assemble an unlimited size file, using several different disk drives.

- Supports conditional IF/THEN/ELSE assembly.
- Supports Disk Library files (include).
- Supports standard motorola assembler directives
- Allows multiple values for FDB & FCB directives.
- Generates listings to Hi-Res text screen or printer.
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- Supports up to 9 open disk files during assembly.
- Allows assembly from editor buffer, Disk or both.
- Full description text error messages.

DEBUG is a free standing program debugger which provides all the functions supported by most system monitors. Some of them include:

- Examine and change the contents of memory.
- Set and display up to 10 breakpoints in memory.
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Requires 32K and Disk $59.00

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- Fully supports the use of 80 column hardware cards.

TEXTPRO III is an advanced word processing system designed for speed, flexability and extensive document processing. It is not like most of the other word processing programs available for the Color Computer. If you are looking for a simple word processor to write letters or other short documents, then most likely you'll be better off with one of the other word processors. But, if you want a powerful word processing program with extensive document formatting features to handle large documents, term papers, manuals, complex formating problems and letter writing, then TEXTPRO is what your looking for. TEXTPRO works in a totally different way than most word processing programs. It uses simple 2 character abbreviations of words or phrases for commands and formatting information that you imbed directly in your text. There are over 50 different formating commands you can use without ever leaving the text your working on. There are no time comsuming, and often furstrating menu chases, you are in total control at all times. The formatted output can be displayed directly on the screen, showing you exactly what your printed document will look like before a single word is ever printed. This includes margins, headers, footers, page numbers, page breaks, underlining, column formating and full justification.

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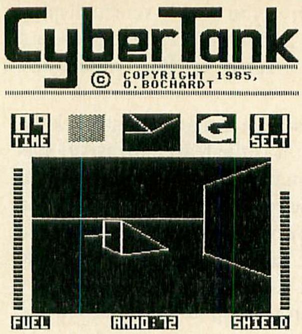

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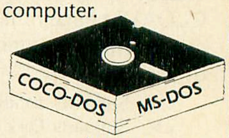

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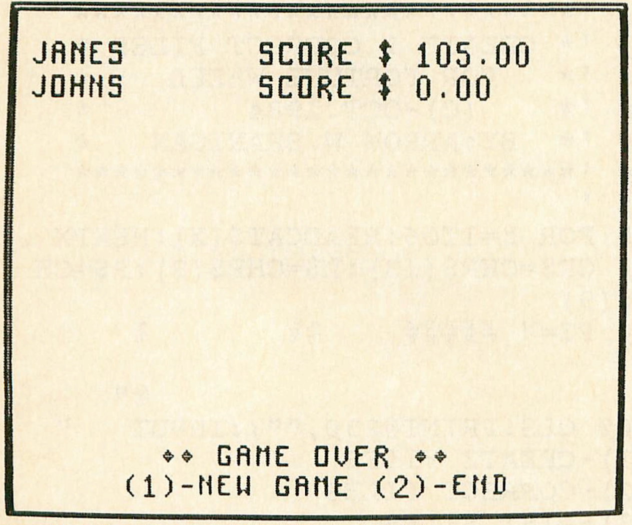
```
140 '*************************
150 '**GET FILE TO CORRECT **
160 '*************************
170 '
180 CLS:PRINT@230,"";:INPUT   "E
NTER FILE #                  T
O BE CORRECTED";FI
190 GOSUB 670
200 IFFI<1ORFI>LOF(1)THENCLOSE#1
:GOTO180
210 GET#1,FI:A1$=A$:B$=B1$:CLOSE
#1
220 '
230 '*************************
240 '**   PROCESS ROUTINE    **
250 '*************************
260 '
270 PS=1:POKE65495,0:CLS:IFSE=1T
HENB$=STRING$(64," ")
280 IFSE=1THENPRINT@448,"TYPE PU
ZZLE THEN PRESS ENTER":ELSE PRIN
T@448,"DO CORRECTIONS THEN PRESS
 ENTER"
290 C1$=MID$(B$,PS,1):IFASC(C1$)
>64ANDASC(C1$)<91THENCUR$=CHR$(A
SC(C1$)+32):ELSECUR$=CHR$(128)
300 C$=INKEY$:PRINT@0,B$:PRINT@P
S-1,CUR$;:IFC$=""THEN290
310 IFC$=CR$THENPOKE65494,0:GOTO
380
320 IFC$=L$ANDPS>1THENPS=PS-1:GO
TO300
330 IFC$=R$ANDPS<64THENPS=PS+1:G
OTO300
340 IF C$=L$ORC$=R$THEN300
350 MID$(B$,PS,1)=C$
```



```
JAMES          SCORE $ 105.00
JOHNS          SCORE $ 0.00

       ◆◆ GAME OVER ◆◆
    (1)-NEW GAME (2)-END
```

```
360 IFPS<64THENPS=PS+1
370 GOTO300
380 CLS:PRINT@0,B$
390 PRINT@230,"ENTER CATEGORY
              (1)-PHRASE
              (2)-TITLE
              (3)-PLACE
              (4)-PERSON
              (5)-PRESIDENT
            ";
400 INPUT                       "
 (6)-BIBLE PHRASE
 MAKE SELECTION";A1$
410 IFA1$<"1"ORA1$>"6"THEN390
420 GOSUB670
430 LSETA$=A1$:LSETB1$=B$
440 IFSE=1THENPUT#1,LOF(1)+1:ELS
EPUT#1,FI
450 CLOSE#1:RETURN
460 '
470 '*************************
480 '** LIST FILE ROUTINE    **
490 '*************************
500 '
510 CLS:PRINT@230,"";:INPUT"DO Y
OU WANT                    HARD
 COPY Y/N";CO$:IFCO$<>"Y"ANDCO$<
>"N"THEN510
520 GOSUB670
530 CLS:PRINT"FILE LENGTH=";LOF(
1):INPUT"ENTER FILES:START,END";
ST, EN:IF EN>LOF(1)THENEN=LOF(1)
:ELSEIFST<1ORST>LOF(1)OR EN<1OR
EN >LOF(1)ORST> EN THEN530
540 IFCO$="Y"THENPRINT#-2,CHR$(2
7);CHR$(20):PRINT#-2,"CATEGORIES
";CR$;"(1)-PHRASE";CR$;"(2)-TITL
E";CR$;"(3)-PLACE";CR$;"(4)-PERS
ON";CR$;"PRESIDENT"
550 IFCO$="Y"THENPRINT#-2:PRINT#
-2:PRINT#-2,"RECORD  CATAGORY
NOMENCLATURE"
560 FORX=ST TO EN
570 GET#1,X:A1$=A$:B$=B1$
580 PRINT"RECORD";X;CR$;"CATAGOR
Y";CR$;A1$;"-";CAT$(VAL(A1$));CR
$;B$
590 IF CO$="Y"  THEN PRINT#-2, U
SING P$ ; X,A1$,B$
600 IFCO$="N"THENFORY=1TO1500:NE
XTY
610 NEXTX:CLOSE#1:IF CO$="Y"THEN
PRINT#-2,CHR$(27);CHR$(19);:RETU
RN:ELSE RETURN
620 '
630 '*************************
640 '**     OPEN FILES      **
650 '*************************
660 '
670 OPEN "D",#1,"CATEGORY",65
680 FIELD#1,1AS A$,64 AS B1$:RET
URN
690 DATA PHRASE,TITLE,PLACE,PERS
ON,PRESIDENT,BIBLE PHRASE
```

```
2G1L2H1U1
2170 DATA BR5BD10U8G4R6,BR6BD2L4
D3R3F1D3G1L2H1U1,BR6BD3H1L2G1D6F
1R2E1U3H1L1G1,BR2BD2R4D2G3D3
2180 DATA BR3BD2R2F1D2G1L2R2F1D2
G1L2H1U2E1H1U2E1,BD9BR2F1R2E1U6H
1L2G1D2F1R2,BR4BD3D1BD3D1,BR4BD3
D1BD3D1G1
2190 DATA BR6BD2G4F4,BD4BR2R4BD3
L4,BD2BR2F4G4,BR2BD3E1R2F1D1G2D1
BD2D1
2200 DATA BR4BD6H1G1F1E1U1D1R2U2
H1L3G1D3F1R4E1,BD9BR2U4R3L3U2E1R
2F1D6,BR2BD2R3F1D1G1L2R2F1D2G1L3
U7,BR6BD2D1U1L4D7R4U1
2210 DATA BR2BD2R1D7L1R3E1U5H1L3
,BR6BD2L4D3R2L2D4R4,BR6BD2L4D3R2
L2D4,BR6BD3U1L4D7R4U3L1
2220 DATA BR2BD2D7BR4U4L3R3U3,BR
4BD2L1R2L1D7L1R2,BR6BD2D6G1L2H1,
BR2BD2D7U4R1E3G3F3D1
2230 DATA BR2BD2D7R4,BD9BR2U7F2E
2D7,BD9BR2U7F4D3U7,BR2BD2D7R4U7L
4
2240 DATA BD9BR2U7R3F1D2G1L3,BR2
BD3D5F1R2E1F1H3F2U5H1L2,BD9BR2U7
R3F1D1G1L2F3D2,BR6BD3U1L4D3R4D4L
4U1
2250 DATA BD2BR2R4L2D7,BR2BD2D7R
4U7,BR2BD2D5F2E2U5,BR2BD2D7E2F2U
7
2260 DATA BR2BD2D1F4D2BL4U2E4U1,
BR2BD2D1F2E2U1BL2BD2D5,BD2BR2R4D
1G4D2R4,BR5BD2L3D7R3
2270 DATA BR2BD2D1F4D2,BR3BD2R3D
7L3,BR4BD2G2E2F2H2D7,BD6E2G2F2H2
R4
2280 DATA BR2F2,BD6BR6H1L2G1D2F1
R2E1U1D3,BR2BD2D7R2E1U2H1L1G1,BD
5BR3F1BD2G1L1H1U1E1
2290 DATA BR5BD2D6G1L2H1U1E1R1F1
,BD6BR2R3U1H1L2G1D3F1R2E1,BD9BR3
U3L1R2L1U2E1R1F1,BD8BR2F1R2E1U4H
1L2G1D1F1R2
2300 DATA BR2BD2D7BR4U2H1L2G1,BR
4BD3D1BD2D3,BR5BD2D1BD2D3G1L1H1,
BR2BD3D4E3G2F3BL4U2
2310 DATA BR4BD3D6,BD9BR2U4F2E2D
4,BD9BR2U4D2E2R1F1D3,BD9BR2U4R4D
4L4
2320 DATA BD9BR2U5R2F1D1G1L2,BD9
BR5U4H1L2G1D1F1R2,BD9BR2U4D2E2R1
,BD9BR2R2E1H1L1H1E1R2
2330 DATA BD9BR4U6D2L2R4,BD9BR2U
4D4R5L1U4,BD7BR2U2D2F2E2U2,BD9BR
2U4D4E2F2U4
2340 DATA BD9BR2E4BL4F4,BD9BR4U2
H2F2E2,BR6BD9L4E4L4
2350 '**LAST ALPHA CHARACTER**
2360 '
2370 '********************
2380 '***DATA FOR MENU ***
2390 '********************
2400 '
2410 DATA *****************
2420 DATA * (1)-SOLVE     *
2430 DATA * (2)-BUY VOWEL *
2440 DATA * (3)-SPIN      *
2450 DATA *****************
2460 DATA 125,75,5,152,92,10,159
,115,90,152,136,20,120,151,BR,92
,140,30,81,114,70,91,90,80
2470 DATA 152,80,176,108,172,136
,156,160,106,162,84,140,84,100,1
00,80
2480 DATA PHRASE,TITLE,PLACE,PER
SON,PRESIDENT,BIBLE PHRASE
2490 '
2500 '************************
2510 '**   THEME SONG       **
2520 '************************
2530 '
2540 FORTS=1TO2:PLAY"T6O2L8D#EGA
L4CBAA-GG#L2AL4GG#AB-BP16O+CO-BA
A-GG#L2AL4GG#ABO+C":NEXTTS:PLAY"
T255L255O5":RETURN
```

190 27
350 174
540 20
END 143

Listing 2: CREATOR

```
10 '**************************
20 '* CREATE & CORRECT FILES *
30 '*   FOR FORTUNE WHEEL    *
40 '*    (C)-OCT.1984        *
50 '*  BY:ARRON W.BRANIGAN   *
60 '**************************
70 '
75 FOR X=1TO6:READCAT$(X):NEXTX
80 CR$=CHR$(13):L$=CHR$(8):R$=CH
R$(9)
90 P$=" #####    %%       %

                         %"
100 CLS:PRINT@230,"";:INPUT    "
(1)-CREATE FILES
(2)-CORRECT FILES
(3)-LIST FILES
(4)-END
MAKE SELECTION";SE
110 IFSE=4THENPOKE65494,0:END
120 ON SE GOSUB 270,180,510:GOTO
 100
130 '
```

```
UB1870
1570 CX=1:IFWI=1THENRETURN
1580 X1=30:Y1=172:SP=8:CH=0:CX=0
:FX=0:GOSUB1870:A$="SORRY BAD GU
ESS":GOSUB1140:GOSUB1870:RETURN
1590 '
1600 '**************************
1610 '**  END GAME ROUTINE    **
1620 '**************************
1630 '
1640 FORTG=1TORD:K$(TG)="":NEXTT
G:'***ZERO K$(TG)***
1650 Y1=36:X1=8:Y=0
1660 IFPL=1THEN1770
1670 '****BUBBLE SORT****
1680 C=0
1690 FORY=1TOPL-1
1700 IFSC(Y)<=SC(Y+1)THEN1750
1710 S=SC(Y):S$=N$(Y)
1720 SC(Y)=SC(Y+1):N$(Y)=N$(Y+1)
1730 SC(Y+1)=S:N$(Y+1)=S$
1740 C=1
1750 NEXTY
1760 IFC=1THEN1680
1770 PCLS1:LINE(0,0)-(255,192),P
RESET,B:LINE(2,2)-(253,190),PRES
ET,B
1780 X1=8:Y1=0:FOR BU= PL TO 1 S
```

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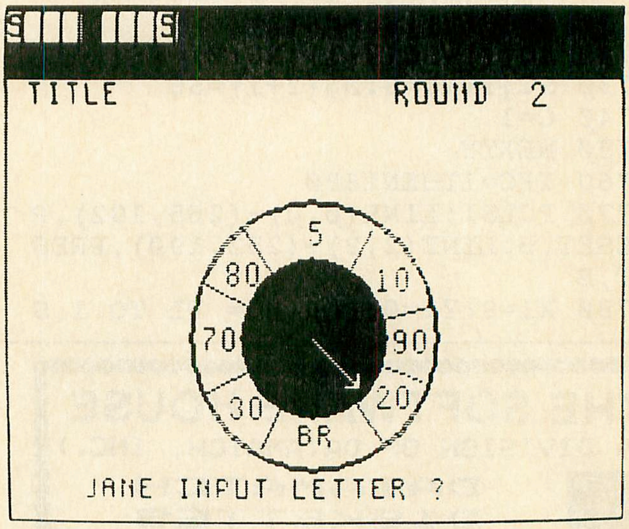
```
TEP-1:Y1=Y1+12:A$=N$(BU)+"S"+STR
ING$(10-LEN(N$(BU))  ," ")+" SCO
RE $"+STR$(SC(BU))+".00":GOSUB11
40:N$(BU)="":SC(BU)=0:NEXTBU:'**
PRINT SCORES"
1790 X1=8*8:Y1=172-12:SP=8:A$="*
* GAME OVER **":GOSUB1140
1800 X1=8*6:Y1=172:SP=8:EX=1:A$=
"(1)-NEW GAME (2)-END":GOSUB1140
1810 G$=INKEY$:'***RESET KEYBOAR
D***
1820 G$=INKEY$:IFG$=""THEN1820
1830 IFG$<"1"ORG$>"2"THEN1820
1840 IFG$="1"THENGOSUB130ELSEPOK
E65494,0:END
1850 GOTO 530
1860 '
1870 '**************************
1880 '*COPY SCREENS 5-8 TO1-4 *
1890 '**************************
1900 '
1910 FORD=4TO1STEP-1:PCOPYD+4TOD
:NEXTD:RETURN
1920 '
1930 '**************************
1940 '**FOLLOWING DATA IS FOR**
1950 '**LEARNING THE ARROWS   **
1960 '**************************
1970 '
1980 DATA U23G4E4F4
1990 DATA E15L4R4D4
2000 DATA R23H4F4G4
2010 DATA F15U4D4L4
2020 DATA D23E4G4H4
2030 DATA G15U4D4R4
2040 DATA L23E4G4F4
2050 DATA H15R4L4D4
2060 '
2070 '**************************
2080 '**FOLLOWING DATA'S FOR **
2090 '**LEARN THE ALPHABET    **
2100 '**************************
2110 '
2120 DATA C1BR1BD1D10R1U10R1D10R
1U10R1D10R1U10R1D10R1U10C0,BR4BD
2D3BD2BD1D1,BR2BD2D1BR3U1,BR3BD3
D6BR2U6BF2L6BD2R6
2130 DATA BR4BD2D8U1H2F2E2H4E2F2
,BR3BD2D1BR3BU1D2G4D2BR3U1,BD10B
R6U2H4U1E2F2G4D1F2E3,C0BR4BD2D2C
1
2140 DATA BR5BD2G2D4F2,BR3BD2F2D
4G2,BR4BD4G2F1E2F1G2,BR4BD4D4BH2
R4
2150 DATA BR4BD9D1G1,BD6BR2R4,BR
4BD8D1,BR2BD8E5
2160 DATA BR4BD2L1G1D6F1R2E1U6H1
L1,BR4BD2BG2E2D8L2R4,BD4BR2U1E1R
2F1D2G4D1R5,BR2BD4U1E1R2F1D2G1F1
```

```
1080 NEXTX3
1090 FL=FL+1:CH$(FL)=LT$:'**REME
MBER CHECK VALUE***
1100 PCOPY1TO5
1110 CLS:X=0:R=0:SCREEN1,1:RETUR
N
1120 '
1130 '*************************
1140 '*DRAW CHARACTER ROUTINE *
1150 '*************************
1160 '
1170 Y6=0
1180 X4=0:FORX2= 1TOLEN(A$):X$=S
TR$(X1+X4*SP):Y$=STR$(Y1+Y6):PLA
Y"1":A1=ASC(MID$(A$,X2,1))-31:DR
AW"BM"+X$+","+Y$+L$(A1):X4=X4+1:
IFY6=0ANDX4=32ANDEX=1THENY6=12:X
1=0:X4=0:NEXTX2:ELSE NEXTX2:PLAY
"V31":DRAW"S4"
1190 RETURN
1200 '
1210 '*************************
1220 '*BUY VOWEL AND DRAW    **
1230 '*BLANKS & PUNCTUATION  **
1240 '*************************
1250 '
1260 IFE$="2"ANDSC(PI)<25THENRET
URN
1270 IFE$="2"THENDRAW"S4":X1=8:Y
1=172:SP=8:GOSUB1870:A$=N$(PI)+"
 ENTER VOWEL ?":GOSUB1140
1280 IFE$="2"THENV$=INKEY$:IFV$=
""THEN1280
1290 PLAY"V31":FORDD=1TO5:PLAY"C
DEFGAB":NEXTDD:PLAY"V31"
1300 IFE$="2"THENIFV$=CHR$(13)OR
V$><"A"ANDV$><"a"ANDV$><"E"ANDV$
><"e"ANDV$><"I"ANDV$><"i"ANDV$><
"O"ANDV$><"o"ANDV$><"U"ANDV$><"u
"THENPLAY"AAAAAAAAAAAAA":GOTO128
0
1310 VC=0:X1=-8:Y1=1:FORX5=1TOLE
N(C$):X1=X1+8:A$=MID$(C$,X5,1):I
FX5=33THENX1=0:Y1=13
1320 IFE$=""THENIFA$="'"ORA$="!"
ORA$="#"ORA$="$"ORA$=":"ORA$=";"
ORA$=","ORA$="."ORA$="?"THENGOSU
B1140
1330 IFA$=" "ANDE$=""THENL$(1)=B
K$:GOSUB1140:L$(1)=B1$
1340 IFE$="2"ANDV$=A$THENCH=1:GO
SUB1140:VC=1
1350 NEXTX5:IFE$="2"THENSC(PI)=S
C(PI)-25:PCOPY1TO5:RETURN:ELSE P
COPY1TO5:RETURN
1360 '
1370 '*************************
1380 '**   SOLVE ROUTINE    ***
1390 '*************************
1400 '
1410 WI=0:SLV$="":X1=0:Y1=36:SP=
8:A$=CHR$(123):GOSUB1140
1420 SV$=INKEY$:IFSV$=""THEN1420
1430 IFSV$=CHR$(13)THEN1540
1440 IFSV$=CHR$(8)THENSLV$=MID$(
SLV$,1,LEN(SLV$)-1):A$=CHR$(124)
:GOSUB1140:X1=X1-8:GOTO1470
1450 IFASC(SV$)>=8ANDASC(SV$)<=1
3THENPLAY"O1AAAAAAAAAAAAAO5":GOT
O1420:ELSEIFASC(SV$)>=91ANDASC(S
V$)<=95ORSV$=CHR$(21)THENPLAY"O1
AAAAAAAAAAAAO5":GOTO1420:'***KIL
L UNWANTED KEYS***
1460 A$=CHR$(124):GOSUB1140:SLV$
=SLV$+SV$:A$=SV$:GOSUB1140:X1=X1
+8
```

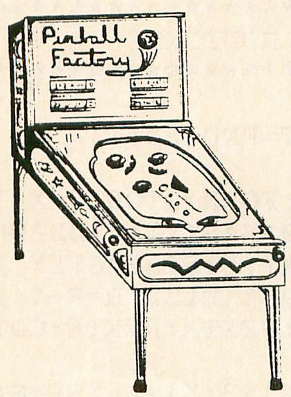


TITLE ROUND 2

JANE INPUT LETTER ?

```
1470 LS=LEN(SLV$)
1480 IFLS>31THENY1=48
1490 IFLS=32THENX1=0
1500 IFLS=31THENX1=248
1510 IFLS<32THENY1=36
1520 IFSV$=CHR$(8)THENA$=" ":GOS
UB1140
1530 A$=CHR$(123):GOSUB1140:GOTO
1420
1540 SOV$=SLV$+STRING$(64-LEN(SL
V$)," "):'***ADD BLANK SPACES***
1550 IFC$=SOV$THENSC(PI)=SC(PI)*
3:FORTY=1TO10:FORFD=0TO1:SCREEN1
,FD:PLAY"O4EFG":NEXTFD:NEXTTY:PL
AY"O1":FORDD=1TO2:FORCC=1TO4:PLA
Y"1;2;3;4;5;6;7;8;9;10;11;12O+":
NEXTCC:FORCC=1TO4:PLAY"12;11;10;
9;8;7;6;5;4;3;2;1O-":NEXTCC:NEXT
DD:PLAY"O5":WI=1
1560 IFWI=1THENX1=0:Y1=1:EX=1:A$
=SLV$:GOSUB1140:FORE=2TO4:PCOPYE
+4TOE:NEXTE:X1=8:Y1=172:SP=8:DRA
W"S4":A$=N$(PI)+" WINS ROUND $"+
STR$(SC(PI))+".00":GOSUB1140:GOS
```

The art of entertainment



Pinball Factory *by Kary McFadden*

The video game comes full circle in this glorious tribute to the original. Classic pinball spings to life as never before, with fresh new angles that only the computer can offer. Crisp graphics, sound, and fast, smooth action give this machine-language arcade game a realistic, responsive feel you'll hardly believe. There are even "tilt" buttons that let you "bump" the machine!

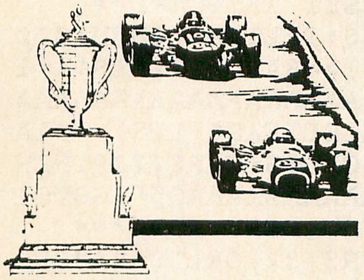
In addition to playing a great game of pinball, you can enjoy hours of creative pleasure as you design, build, and edit your own screens. Save and load your favorite creations. The joystick-controlled cursor makes it all easy.

Change the board: build with bumpers, tabs, and a multitude of solid obstacles to form any configuration imaginable.

Change the face: draw your own title board with lines, rays, and shape patterns. Add text in three different colors, and two dirrent sizes.

Change the rules: alter the gravity, bounce, and scoring!

64K Color Computer required. $34.95



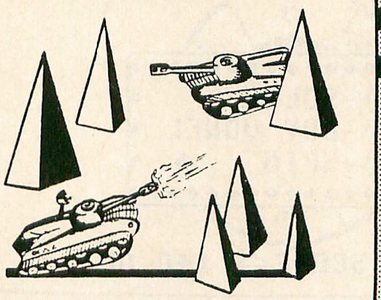
Speed Racer *by Steven Hirsch*

The checkered flag drops as your pulse rises in this lively new arcade game. The road twists to the horizon on the 3-D panorama that sets the stage for the most exciting race the CoCo has ever seen!

Vie for time as you speed through the curves at incredible speeds. Step through the gears to stay ahead of the pack, but step lively since some will stop at nothing to see the end of the race, or the end of you!

Four challenging raceways, complete with obstacles and colorful 3-D scenery, put your skills to the test in this Pole Position™ type game.

32K Color Computer required. $34.95



Rommel 3-D *by Kary McFadden*

You clutch the tank controls, searching for any sign of the enemy. Suddenly a blip appears on radar! Frantically, you move your tank into position. At last you spot the elusive enemy tank! Facing it, you race to lock sights and fire before he does!

Enter the ultimate battle-zone in this exciting 3-D tank combat game. Strategy, speed, and your tank's cannon are your only hope as you wind through a three-dimensional course inhabited by impenetrable barriers and enemy tanks.

Dazzling graphics and lifelike sound take you a step beyond the ordinary in this fast, machine-language arcade game. Enter the next dimension, ROMMEL'S troops are waiting for you!

32K Color Computer required. $29.95

MichTron

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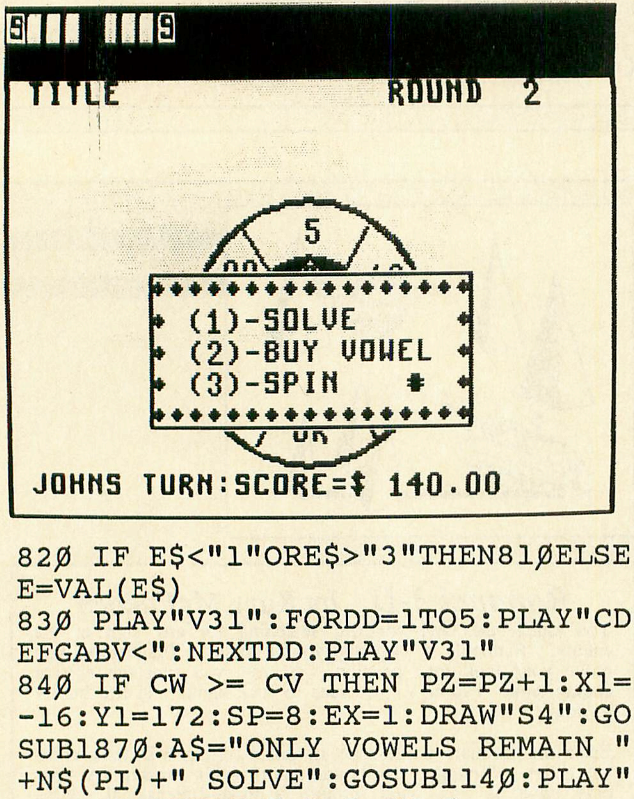
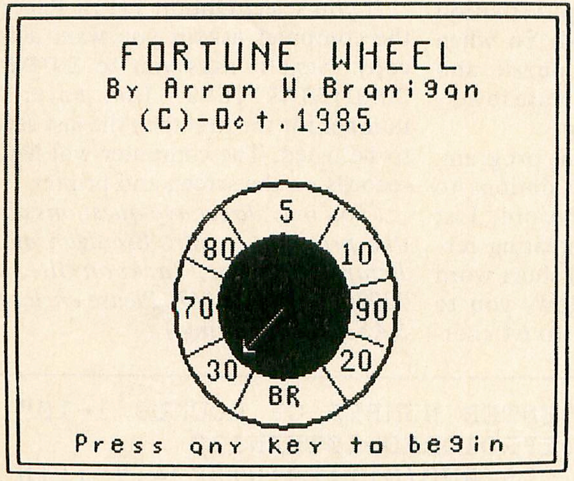
```
10:ELSE DRAW"BM128,120C1S5;XA$(1
);":'**COPY PAGE 5-8 TO 1-4 AND
GO PRINT PUNCTUATION AND SPACES*
**
770 IFGY=1THENX1=8:Y1=25:SP=8:DR
AW"S4":A$=STRING$(12," "):GOSUB1
140:A$=CAT$(CAT):GOSUB1140:X1=16
0:A$=STRING$(9," "):GOSUB1140:A$
="ROUND "+STR$(RO):GOSUB1140:PCO
PY 1 TO 5:GY=0:GOSUB2540
780 IF CW>= CV THENE$="1":GOTO83
0
790 DRAW"C0S4":CH=0:CX=0:X1=8:Y1
=172:SP=8:A$=N$(PI)+"S TURN:SCOR
E=$"+STR$(SC(PI))+".00":GOSUB114
0
800 PUT (60,96)-(196,156),M,PSET
:X1=168:Y1=132:'**DISPLAY MENU**
810 E$=INKEY$:IFE$><""THEN820ELS
EA$=" ":GOSUB1140:A$="#":GOSUB11
40:GOTO810
```



```
820 IF E$<"1"ORE$>"3"THEN810ELSE
E=VAL(E$)
830 PLAY"V31":FORDD=1TO5:PLAY"CD
EFGABV<":NEXTDD:PLAY"V31"
840 IF CW >= CV THEN PZ=PZ+1:X1=
-16:Y1=172:SP=8:EX=1:DRAW"S4":GO
SUB1870:A$="ONLY VOWELS REMAIN "
+N$(PI)+" SOLVE":GOSUB1140:PLAY"
T2L2GL255T255":E=1:CH=0
850 ON E GOSUB 1370,1210,950:'**
GOTO GUESS BUY VOWEL OR SPIN ROU
TINE**
860 IF CH=1THEN760
870 IFCX=1ORFL=64ORWI=1 THENX1=0
:Y1=1:SP=8:EX=1:FOREE=1TOFL:CH$(
EE)="":NEXTEE:FL=0:NEXTRO:GOTO16
00
880 IF PZ>= PL THENX1=0:Y1=1:SP=
8:EX=1:A$=MID$(C$,1,TL):GOSUB114
0:X1=8:Y1=36:EX=1:A$="SORRY NO W
INNER THIS ROUND":GOSUB1140:FORE
E=1TOFL:CH$(EE)="":NEXTEE:FL=0:N
EXTRO:GOTO1600
890 GOTO 750
900 '
910 '***************************
920 '**  SPIN ROUTINE         **
930 '***************************
940 '
950 DRAW"S5":T=RND(20)
960 GOSUB1870
970 FORE=1TOT:FORX=1TO8:Y=X-1:DR
AW"BM128,120C0;XA$(Y);":DRAW"BM1
28,120C1;XA$(X);":PLAY"GFE":IFR>
T+100THENGOTO980 ELSE R=R+3:FORT
Z=1TOR:NEXTTZ:NEXTX:NEXTE:GOTO97
0:'***SPIN***
980 IFX=5THENX1=8:Y1=25:SP=8:SC(
PI)=0:DRAW"S4C0":FORTP=1TO20:FOR
TK=0TO1:SCREEN1,TK:PLAY"O3BC":NE
XTTK:NEXTTP:A$=STRING$(15," "):G
OSUB1140:A$="BANKRUPT":GOSUB1140
:PLAY"T4L4":FOREC=1TO5:PLAY"O3CO
1C":NEXTEC:CH=0:CX=0:PLAY"T255L2
5505":GOTO1110
990 DRAW"S4C0":X1=30:Y1=172:SP=8
:A$=N$(PI)+" INPUT LETTER ?":GOS
UB1140
1000 PLAY"T255L255":W$=INKEY$:'*
*SET PLAY & RESET KEYBOARD**
1010 LT$=INKEY$:IFLT$=""THEN1010
1020 IFASC(LT$)>=8ANDASC(LT$)<=1
3THENPLAY"O1AAAAAAAAAAAAAAAAAAAA
O5":GOTO1010:ELSEIFASC(LT$)>=91A
NDASC(LT$)<=95ORLT$=CHR$(21)THEN
PLAY"O1AAAAAAAAAAAAAAAAO5":GOTO1
010:'***KILL UNWANTED KEYS***
1030 IF LT$=CHR$(32)ORLT$="A"ORL
T$="a"ORLT$="E"ORLT$="e"ORLT$="I
"ORLT$="i"OR LT$="O"ORLT$="o"ORL
T$="U"ORLT$="u"THENPLAY"O3AAAAAA
AAAAAAAAAAO5":GOTO1010:'***KILL
VOWELS***
1040 PLAY"V31O5":FORDD=1TO5:PLAY
"CDEFGABV<":NEXTDD:PLAY"V31"
1050 FOREG=1TO52:IFLT$=CH$(EG)TH
ENX3=0:CH=0:CX=0:PLAY"O5":FORY5=
1TO4:PLAY"12;11;10;9;8;7;6;5;4;3
;2;10-":NEXTY5:PLAY"O5":X1=8:Y1=
172:GOSUB1870:A$="LETTER ALREADY
 USED":GOSUB1140:EG=0:GOTO1110:E
LSENEXTEG
1060 X1=-8:Y1=1:SP=8:FORX3=1TOLE
N(C$):X1=X1+8:A$=MID$(C$,X3,1):I
FX1>248THENY1=13:X1=0
1070 IFA$=LT$THENSC(PI)=SC(PI)+V
AL(NB$(X)):CH=1:CW=CW+1:GOSUB114
0'**INCREASE SCORE BY NUMBER OF
LETTERS CORRECT***
```

```
280 '***************************
290 '*****SET UP GRAPHICS******
300 '****  &TITLE SCREEN  *****
310 '***************************
320 '
330 PLAY"T255L255O5"
340 PCLS1:X1=0:SP=8:FORY=0TO4:DR
AW"C0S4":Y1=Y*12:A$=M$(Y+1):GOSU
B1140:NEXTY:'**DRAW MENU**
350 LINE(1,1)-(135,59),PRESET,B:
GET(0,0)-(136,60),M,G:'**STORE M
ENU**
360 PCLS1:CIRCLE(128,120),30,0
370 PAINT(128,120),0,0
```



FORTUNE WHEEL
By Arron W.Branigan
(C)-Oct.1985

Press any key to begin

```
380 CIRCLE(128,120),50,0:CIRCLE(
128,120),51,0
390 SP=8:FORS=1TO8:READX1,Y1,A$:
NB$(S)=A$:GOSUB1140:NEXTS:'***DR
AW NUMBERS ON WHEEL***
400 FORS=1TO8:READX,Y:LINE(128,1
20)-(X,Y),PRESET:NEXTS
410 FORS=1TO6:READCAT$(S):NEXTS:
'**READ CATAGORIES***
420 LINE(0,0)-(255,192),PRESET,B
:LINE(5,5)-(250,187),PRESET,B
430 DRAW"BM128,120C1S5;XA$(1);C0
"
440 FOR X=1 TO 4:PCOPY X TO X+4:
NEXTX
450 DRAW"C1S5BM128,120;XA$(1);"
460 PLAY"V31O5":PMODE4,1:SCREEN1
,1:X1=51:Y1=12:SP=12:DRAW"S6C0":
A$="FORTUNE WHEEL":GOSUB1140:X1=
45:Y1=27:SP=9:DRAW"S4":A$="By Ar
ron W.Branigan":PLAY"O3":GOSUB11
40:X1=60:Y1=39:A$="(C)-Oct.1985"
:GOSUB1140
470 X1=30:Y1=172:SP=9:A$="Press
any key to begin":PLAY"O1":GOSUB
1140:PLAY"O5":DRAW"S5"
480 FORG=1TO8:DRAW"BM128,120C1;X
A$(G);":PLAY"BAGFED":DRAW"BM128,
120C0;XA$(G);":IFINKEY$><""THEND
RAW"BM128,120C1;XA$(1);":GOSUB25
40:GOTO490:ELSE NEXTG:GOTO480
490 DRAW"BM128,120C1;XA$(G);":DR
AW"S5":PMODE4,5:LINE(5,5)-(250,1
87),PSET,B
500 SCREEN 1,1:DRAW"S4"
510 '
520 '***************************
530 '********GAMEPLAY*********
540 '***************************
550 '
560 PT=PL
570 FORRO=1TORD
580 POKE65494,0:OPEN "D",#1,"CAT
EGORY",65:'**OPEN FILE**
590 FIELD#1,1 AS CT$,64 AS K$
600 SS=0:DS=RND(LOF(1)):GET#1,DS
:CAT=VAL(CT$):C$=K$:GY=1
610 FORSS=1TORO:IFK(SS)= DS THEN
600ELSENEXTSS:'***COMPARE IF FIL
E IS ALREADY USED THIS GAME***
620 K(RO)= DS :CLOSE#1:POKE65495
,0:'**SAVE FILE FOR FUTURE COMPA
RE**
630 TL=0:FORTL=64TO1STEP-1:IFMID
$(C$,TL,1)><" "THEN640:ELSENEXTT
L:'**FIND LENGTH OF C$ MINUS BLA
NK SPACES**
640 '
650 '***************************
660 '*  COUNT CONSONANTS        *
670 '***************************
680 PZ=0:CV=0:CW=0:FORZZ=1TO64:R
$=MID$(C$,ZZ,1)
690 IFASC(R$)>65THENIFR$><"A"AND
R$><"a"ANDR$><"E"ANDR$><"e"ANDR$
><"I"ANDR$><"i"ANDR$><"O"ANDR$><
"o"ANDR$><"U"ANDR$><"u"THENCV=CV
+1
700 IFASC(R$)>47ANDASC(R$)<58THE
NCV=CV+1
710 NEXTZZ:'**END COUNT CONSONAN
TS**
720 PT=PT+1:IFPT> PL THENPT=0:'*
**SELECT WHO GOES FIRST EACH ROU
ND***
730 PI=PT:E$=""
740 PMODE4,5:SCREEN1,1:DRAW"S4":
X1=0:Y1=0:SP=8:EX=1:A$=STRING$(6
4,CHR$(125)):GOSUB1140:PMODE4,1:
SCREEN1,1:CX=1:'**DRAW SQUARES O
N PAGE 5**
750 WI=0:PI=PI+1:IFPI> PL THENPI
=1
760 GOSUB1870:IFE$=""THENGOSUB12
```

by the value of the spin multiplied by the number of times the letter appears in the puzzle.

After the final round is played, the computer displays the scores from highest to lowest. If all consonants are shown before the puzzle is solved, the computer asks for the solution to the puzzle. If no one guesses correctly, then it displays `SORRY NO WINNERS THIS ROUND` and advances to the next round.

Listing 1, *Fortune Wheel*, is the main game. Listing 2 is for creating puzzle and category files for *Fortune Wheel*. When keying in Listing 1 be careful to space it just as it is in the listing. If you don't space correctly, you will get an SN Error. Be sure to type in both listings and save them on disk before using Listing 2 to create the puzzle file. This listing creates direct files and it will write on top of any file or program saved after establishing the puzzle file. This should be a dedicated disk.

This game will only run on a 64K Extended BASIC machine. It uses direct access files so it works only with a disk drive. If you want to use it with a cassette, you need to modify lines 580 through 620.

I have used the speed up and slow down pokes (`POKE 65495,0` and `POKE 65494,0`) in several places in the program. I found that you must use them in lines 580 and 620 because these lines are in the retrieve record routine.

One final note on Listing 1: In the alphabet `DATA` lines, I have created a data record for the computer to draw every alphabet character (true upper- and lowercase) and all the punctuation characters on the keyboard. So when using Listing 2 to create puzzle and category records, feel free to use lowercase letters and punctuation.

When you load and run the program, a menu appears giving the options to Create Records, Correct Record, List Records and End. When creating records, the computer enters a short word processing routine that allows you to type in a puzzle record up to 64 characters long. Once the record is the way you want it, press ENTER. The Enter Category menu pops up giving the choice of phrase, title, place, person, president and Bible phrase for categories.

If you choose the Correct Record option from the first menu, the computer asks you to enter the number of the record you want and retrieves the record so you can correct it. After all corrections are made, press ENTER and the Enter Category menu pops up again for you to enter the record category.

If you select Option 3 (List Records) the computer asks if you want a hard copy. Next it asks you to `ENTER RECORD:START,END`. Just enter the number for the first then the last record to be listed. The computer will list the records on the screen and printer.

(You may direct any questions about this program to Mr. Branigan at 105 Briarfield Cove, Jacksonville, AR 72076, 501-982-6067. Please enclose an SASE when writing.) ☐

180	71	1360	169
370	184	1540	99
490	10	1670	20
660	50	1880	88
770	216	2130	49
870	91	2220	199
990	226	2310	165
1060	205	END	136
1260	26		

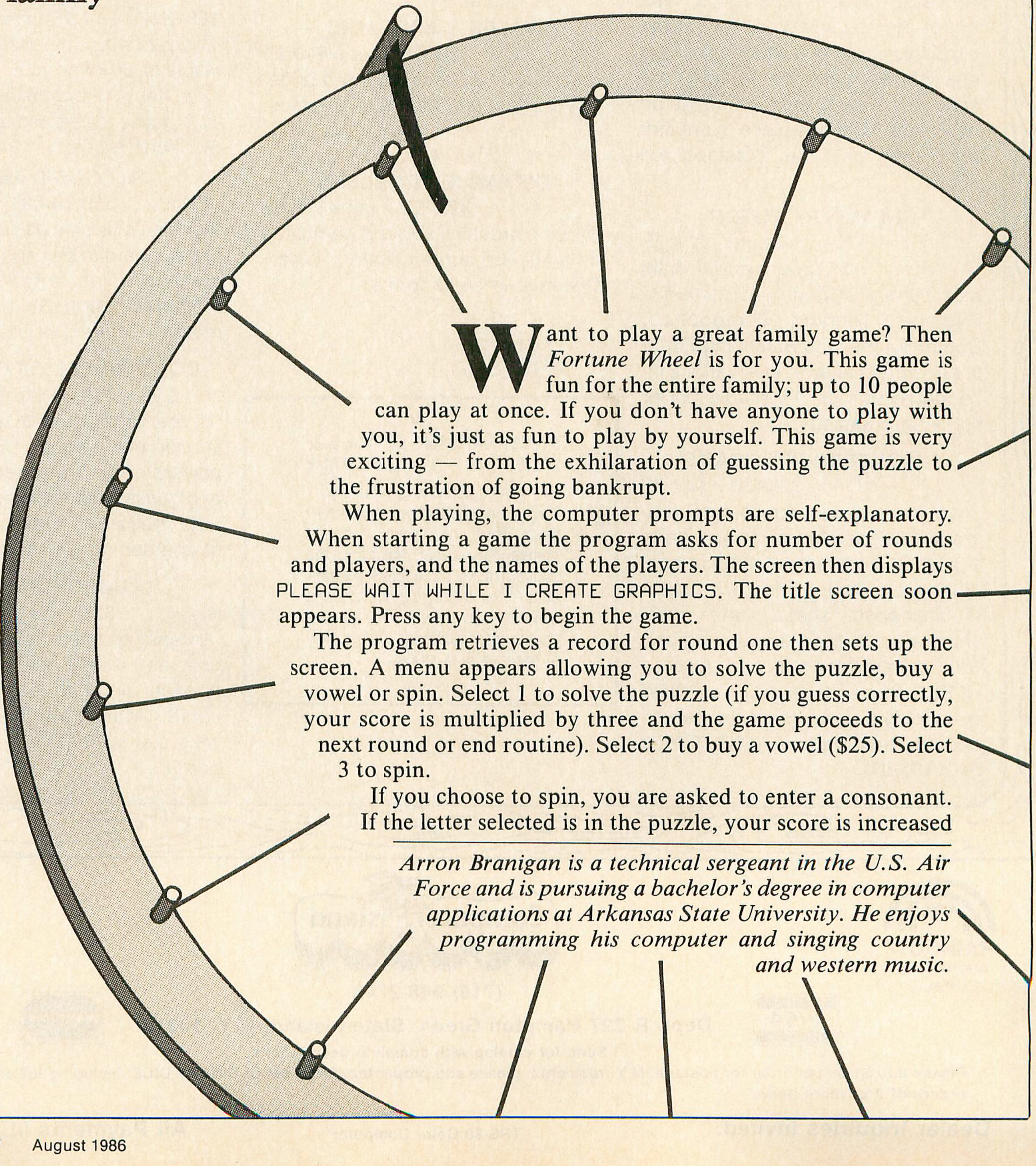
Listing 1: `WHEEL`

```
10 '***************************
20 '**      FORTUNE WHEEL      **
30 '**     (C)-OCT.1985        **
40 '**  BY:ARRON W.BRANIGAN    **
50 '***************************
60 '
70 CLEAR 1000:PCLEAR8:DIM L$(94)
,M(15,15),CH$(56):PT=1:GOSUB130:
GOTO160
80 '
90 ' ***************************
100 '** PLAYER INPUT ROUTINE  **
110 '***************************
120 '
130 CLS(RND(8)):PRINT@224,"";:IN
PUT"ENTER NUMBER OF ROUNDS 1-10"
;RD:IFRD1ORRD>10THEN130
140 CLS(RND(8)):PRINT@224,"";:IN
PUT"ENTER NUMBER OF PLAYERS (10
MAX)";PL:IFPL<1ORPL>10THEN140
150 CLSRND(8):FORX=1TOPL:PRINT"E
NTER PLAYER";X;"S NAME";:INPUTN$
(X):NEXTX:RETURN
160 CLS(8):PRINT@224,           "
      PLEASE WAIT WHILE
      I CREATE GRAPHICS    ":SCR
EEN0,1:PMODE4,1
170 POKE65495,0
180 L$(92)="BD12R8":L$(93)="C1BD
12R8C0":'***BUILD UNDERLINE STRI
NG**
190 '
200 '***************************
210 '**LEARN ALPHABET & ARROWS**
220 '***************************
230 '
240 FORX=1TO8:READA$(X):NEXTX:FO
RX=1TO91:READL$(X):NEXTX:FORX=1T
O5:READM$(X):NEXTX:A$(0)=A$(8):L
$(94)="C1BD1D12R1U12R1D12R1U12R1
D12R1U12R1D12R1U12C0L8D12R8U12"
250 B1$=L$(1):BK$="C0"+MID$(L$(1
),3,LEN(L$(1)))
260 '**END LEARN ALPH & ARROWS**
270 '
```

Fortune Wheel

This challenging game provides fun and excitement for the whole family

By Arron W. Branigan



Want to play a great family game? Then *Fortune Wheel* is for you. This game is fun for the entire family; up to 10 people can play at once. If you don't have anyone to play with you, it's just as fun to play by yourself. This game is very exciting — from the exhilaration of guessing the puzzle to the frustration of going bankrupt.

When playing, the computer prompts are self-explanatory. When starting a game the program asks for number of rounds and players, and the names of the players. The screen then displays `PLEASE WAIT WHILE I CREATE GRAPHICS`. The title screen soon appears. Press any key to begin the game.

The program retrieves a record for round one then sets up the screen. A menu appears allowing you to solve the puzzle, buy a vowel or spin. Select 1 to solve the puzzle (if you guess correctly, your score is multiplied by three and the game proceeds to the next round or end routine). Select 2 to buy a vowel ($25). Select 3 to spin.

If you choose to spin, you are asked to enter a consonant. If the letter selected is in the puzzle, your score is increased

---

Arron Branigan is a technical sergeant in the U.S. Air Force and is pursuing a bachelor's degree in computer applications at Arkansas State University. He enjoys programming his computer and singing country and western music.

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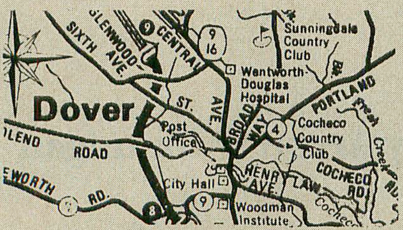

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Chemistry Tutor	10-up	32K-disk	29.95

Disk indicates available on disk only.
Tape prices given.
Add $5.00 for any program on disk.

Computer Island

can also be used to set up custom reports, print mailing labels, etc. The limits seem only to be in the user's ability to program in BASIC. Action templates could even be used on data files created by other programs if the user has sufficient experience.

One of the other major differences between *CoCo Base I* and other database managers is *CoCo Base I*'s ability to create and execute batch files. These are created using Schedule and executed using Jobs. Schedule creates a job file of Action templates. Schedule allows the user to specify the templates to be used as well as the order and type of execution of these templates. For example, a report could be produced by using one template to print a header, the next to find, format and print a list of selected records, and a third to print a footer and totals. Templates can be executed once, once for each record in order, or once for each record in indexed order. Since templates can contain many lines of BASIC code, each one can be quite complex.

Two final options are of interest to those who need to construct new databases from old ones, those who want to create very complex databases, or those like me who invariably enter large amounts of data into a database before they realize that the data structure is wrong. Transfer creates a new database which includes data from an existing database file. Additional fields can easily be included in the new database format, so additional fields can be added to a database. This feature alone could save countless hours of aggravation and programming. I always seem to need just one more field in any database I create after it is in use.

Update gives *CoCo Base I* its claim to being a relational database manager. Update does not access several different related data files at once. Instead it moves selected fields from one data file to another. This requires that each of the files has a field common to the other. Update places fields in the correct record in the receiving database by looking at this "related field." Of course only one related field is used.

This ability to combine data from several data files is useful for a number of things. To me, the most important use is in keeping individual files short and combining information from different files later when the combined information is needed.

If you get the feeling that I am impressed with *CoCo Base I* you are correct; it fits my needs quite well. However, it has a few problems. First is error handling. There are instructions in the manual that tell you what to type in case of an error. This works and is adequate, but it is inelegant. There should be some way of trapping errors before they dump the user back to the OK prompt. Another annoyance was with *CoCo Base I*'s inability to allow a record to be removed from a database. There are many times when a user would like to delete a record from a file. *CoCo Base I* does not allow this in a simple way.

The last complaint has to do with nearly every database management system I have used. I have to keep telling the program the name of the files I am working on. I realize that this is the price one pays for having the ability to store different versions of each file, index, etc., but I still find it a nuisance. Unfortunately, if this "problem" is fixed it would have to be at the expense of flexibility. Given the choice, I'll vote for flexibility.

The last comment I have is not so much a complaint as a suggestion to potential *CoCo Base I* users. Learn BASIC. Although *CoCo Base I* can be used by any non-programmer, the power of the program is best released by someone familiar with BASIC. You could learn BASIC as you go, but previous knowledge is extremely helpful. At first the program may seem weak or difficult to use, but after some practice I find that it can do a great many powerful and useful things.

(JTJ Enterprises, P.O. Box 110841, Nashville, TN 37211, disk $49.95 plus $2 S/H)

One-Liner Contest Winner . . .

This little one-liner produces some interesting graphics designs. It is almost kaleidoscopic.

The listing:

```
0 IFT=1THENX=9*RND(8):FORI=1TO58
STEP2:A=209-X-I:B=258-X-I:C=49+I
:PUT(X+I,I)-(X+C,C),D,NOT:PUT(X+
I,148-I)-(X+C,99-I),D,NOT:PUT(A,
I)-(B,C),D,NOT:PUT(A,148-I)-(B,9
9-I),D,NOT:NEXT:GOTO0:ELSEPMODE4
,1:SCREEN1,1:PCLS1:DIMD(0,98):GE
T(0,0)-(50,50),D,G:T=1:GOTO
```

Rob Weinberg
San Francisco, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

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Software Review

Powerful *CoCo Base I* is Full of Surprises

By D. McGarry

CoCo Base I is the latest offering from JTJ Enterprises of Nashville, Tennessee. I mention this because there is a strong family resemblance between *CoCo Base I* and *CoCo Solver*, JTJ's other product. Several neat programming tricks were included in both programs and both use the same machine language data entry editor. *CoCo Base I* stands on its own as a good, solid database program. If, however, you own and use *CoCo Solver* you will be able to extract maximum performance and flexibility from *CoCo Base I* with less effort than someone with no prior experience. Several features help *CoCo Base I* to stand out from the crowd of other database management systems. First, *CoCo Base I* is a relational database manager. This means that it can access more than one data file by referencing a field common to all files. Second, through the use of Jobs and Schedule options it allows the processing of batch files. Third, the Action option allows for the inclusion of BASIC statements to manipulate data.

CoCo Base I comes on an unprotected disk which includes 10 program files and several sample files. All work is started by typing `RUN "MENU"` at the OK prompt. Menu options are Create, Put, Index, Action, Schedule, Jobs, Transfer and Update.

The first step in creating a database is to use the Create option to create a structure file of the data fields. Each field is given a two-character name, description, length and type. Field types can be either character or numeric. The structure file can be edited at any time and can extend over several screen pages allowing for large or complex records.

Once the structure file is saved, the Put option is used to add, edit, find and print records. Put uses the structure file defined with Create to show records and for data entry. Put can use an existing file or create a new one as records are added. This allows the creation of several database files which all use the same data format.

The next option is Index which does exactly what the name implies. Index files can be saved with their own names, so several index files can exist for the same data file.

Up to this point, *CoCo Base I* looks and acts similar to most database management systems. The additional options make *CoCo Base I* different from any other database manager I have used.

The most unusual and powerful uses of *CoCo Base I* start with the Action option. Action allows the creation of template files which can act on the database. Templates are sets of BASIC language statements that are added to the Action program as it runs. Action statements can be used to do nearly anything to the data file as far as I can tell. I used Action templates to average a set of grades for one of my physics classes. The grades each had a weighting factor. Some of the grades were numeric and some alphabetic. Even though it took some experimentation to get the template correct, Action allowed me to do this job more quickly than any other method I have used. Action

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CoCo Keyboard Beats the Chiclets

Imagine . . . could someone actually like the "chiclet" keyboard on their 'F' board CoCo? I did. I was accustomed to using that keyboard and I can hunt and peck with the best of them. Well, all that changed when I received my review assignment for the replacement keyboard offered by Spectrum Projects.

I received the keyboard and immediately installed it in my Color Computer. The documentation was brief and appeared incomplete. Nevertheless, replacing a keyboard is perhaps one of the easiest upgrades to perform on a CoCo. To make it even easier, the keyboard is the same as the 26-3016 keyboard retailing for $24.95 at Radio Shack (less installation). This means there is no cutting or soldering involved at all.

Simply open the case (keep in mind this voids your warranty), unplug the old keyboard, plug in the new one and close the case. That's all there is to it. After that, you have a keyboard with full-size keys and a better overall feel.

I found it very easy to get used to the new keyboard. Particularly since the key placement is the same as on my old one, but the new keyboard feels better and typing goes a lot smoother. Even touch-typists should like this keyboard more than some others on the market.

The keyboard is designed to fit into any revision of Color Computer from the old 'F' board to the present CoCos. The cable is the transparent, super-thin mylar conductor type. If you have a version earlier than the 'F' board, Spectrum also sells an adapter that allows you to easily install the keyboard in your computer as well. Keep in mind, if you have one of the newer CoCo 2s this is the same keyboard you already have.

I highly recommend this keyboard for anyone and everyone. Its low cost as well as ease of installation make it one of the best upgrade buys on the CoCo market today.

(Spectrum Projects, Inc., P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, keyboard $14.95, adapter $9.95, plus $3 S/H)

— Vic Roberts

One-Liner Contest Winner . . .

Here's a little disk utility for your toolbox. Just enter the track, sector and drive numbers at the prompt and you will be able to examine the disk.

The listing:

```
1 CLEAR 300:INPUT"TRACK:";T:INPU
T"SECTOR:";S:INPUT"DRIVE:";D:DSK
I$ D,T,S,A$,B$:PRINT A$;B$:RUN
```

Anton Sipos
Los Angeles, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Rainbow Book of Simulations* and its companion *The Rainbow Simulations Tape*.)

No Frills U-Buff is an Excellent Value

As much as we hate to admit it, the present-day world puts much emphasis on time. Hurry this and hurry that; it is as if we were in a race to the finish! Well, the U-Buff printer buffer from Digital Devices fits in nicely.

I have given this little gem a thorough run for its money. Over the last month and a half, I have sent it files from Delphi, files from my word processor, data from my BASIC programs and graphics. It hasn't let me down yet. It has always printed each character reliably.

For those who don't know, a printer buffer is nothing more than a go-between. It goes between your computer and printer. A printer is limited in speed. The print head can only move so fast across the page. However, a computer can send data much faster. So the buffer allows the computer to finish sending its data more quickly. Therefore, you don't have to wait all day for the printer to finish before going ahead with your work.

As an example, when I told my system to print a 40.5K file, the prompt was back on the screen in 83.5 seconds. I was already involved in my favorite game when my printer finished printing out the 30 double-spaced pages 15 minutes and 53 seconds later.

The U-Buff is available in two configurations: 16K memory and 64K memory. A nice added feature is the average user can upgrade the unit from 16K to 64K by himself. The manual gives information on what chips to buy and how to install them properly. The only drawback is that the one-year warranty only applies to the configuration purchased from Digital Devices. Still, I believe this is very reasonable.

The buffer is designed to accept input from any computer having a Centronics interface. Since my serial/parallel converter terminates in a Centronics plug, I had no problems. The unit also terminates in a Centronics plug for the printer's parallel port.

The U-Buff comes with a 14-page, easy to read pamphlet. The instructions cover installation, testing, troubleshooting, upgrades and a whole slew of technical information plus a glossary.

Despite its usefulness, keep in mind a printer buffer isn't for everybody. But anyone with a business or who does a lot of printing will surely welcome anything to help them out.

The U-Buff is an excellent, no-frills printer buffer. For the reasonable price it is a good work horse with a good deal of backing from the manufacturer. This one gets four stars.

(Digital Devices Corporation, 430 Tenth St., Suite N205, Atlanta, GA 30318, 16K $119.95, 64K $149.95)

— Cray Augsburg

formatter we published recently, or the *TSWord* formatter. The *DeskMate* editor is very easy to use and a nice way to enter text. Add the dot commands required by *TSWord* or other formatter and you can print it in any way you like.

Many people also like *TSEdit*. It is based on the UNIX VI text editor and does an excellent job. The only reason I haven't bothered to use it is the fact that my fingers already have the *DynaStar* diamond memorized. I would hate to have to learn to touch type all over again. Yet, a friend of mine really likes *TSEdit*. He learned to touch type on *TSEdit* first. He enjoys working with the *TSWord* formatter but he has discovered one problem. I have confirmed the problem but still haven't figured out a solution. If you come up with one, please let me know.

Since memory is limited, divide the writing into shorter files and use *TSWord*'s .NX command. That's fine. In fact, it's a good way to work, even if you don't need to. Unfortunately however, *TSWord* breaks to a new page every time it hits an .NX command. What we need is a way to disable this page break so we can print continuously one page after the other. Here's an example you can use to print three individual files at one time.

```
        .nx part_one
        .nx part_two
        .nx part_three
```

Many people on the CoCo SIG forum seem to believe *DeskMate* files are not compatible with other OS-9 programs. Not so. The secret can be uncovered in the documentation for the terminal program in *DeskMate*. The *DeskMate* editor automatically adds an extension, .DOC, to the end of the filename. Therefore, if you save a file named "Column" it will actually be named "Column.DOC." Save a *DeskMate* file then exit and run the *dir* utility. Then, go ahead and list or dump the file using the complete filename. It worked, didn't it?

The reverse is also true and you could build a file and then edit it with the *DeskMate* editor if you give the file you are building a .DOC extension. For example:

```
OS9: build Example.DOC <ENTER>
```

While we're still talking about *DeskMate*, we should clear up another point. The *DeskMate* terminal program requires you to use the Deluxe RS-232 Pak. You cannot use the /T1 port on the back of the CoCo. Again, bit banging just doesn't work in a multi-tasking environment. If it did, the *DeskMate* programmers would have provided the option to change it. They clearly state that you need the hardware ACIA in the *DeskMate* manual.

Good News for Graphics Programmers

Eric at ColorVenture Software, P.O. Box 1729, Huntington Station, NY 11746 needs a good graphics programmer for an exciting CoCo project. He has been negotiating with Broderbound Software about porting *The Print Shop*, a best-selling program on the Apple and Commodore to the Color Computer. He wants to market it to Tandy, so it must be done in OS-9. Here's your chance! Give him a call at 516-271-8456.

The CoCo/IBM Connection

Many people use an IBM PC or clone at work these days. That's the bad news. The good news is that we can now work at home on our Color Computers, save our efforts on an IBM-compatible disk and carry it to work. In fact you can often get a lot more work done when you get away from the constant interruptions of the workplace.

We owe our new freedom to James Hornsby, who has developed a set of utilities to let you read or write standard Radio Shack DOS single-sided disks as well as standard IBM PC single-sided disks. They use Dan Johnson's Color Computer OS-9 SDisk driver and can also read and rename files on double-sided IBM PC disks. Since they run in OS-9 they also let you send OS-9 files to either Disk BASIC and IBM PC disks, or vice versa. They are most useful for transferring standard ASCII data files. Additionally, if you save a BASIC program in ASCII and transfer the file to the other computer, it should load without a problem.

Sequential ASCII text files from Disk BASIC load into IBM PC editors without a hitch, although you have to add line feeds after each carriage return when using some editors. When you move ASCII text files from an IBM to the Color Computer, you must strip off the extra linefeeds. Hornsby gives you two utilities, *addlf* and *striplf*, to take care of these jobs.

All of Hornsby's utilities use OS-9's standard input and output path. This means their output can be redirected to a file or used in a pipeline. If you avoid using pipes, you can even run these transfer utilities on a single-drive system. A typical single-drive command looks like this:

```
OS9: RSread -s #10K /d0/filename.dat
  >/d0/documents/myfile
```

Here is a typical command line that uses a pipe.

```
OS9: RSread /d1/filename.ext ! addlf
```

When you run this command, RSread reads data from a standard Color Computer disk and writes it to OS-9's standard output path. But the pipe, noted by the exclamation mark (!) diverts this output to the input of the next program in the pipeline, *addlf*. The latter command adds a linefeed after every carriage return and sends its output to OS-9's standard output path. Since there are no more pipes and the standard output has not been redirected, the output of *addlf* appears on the terminal. Programs that work like *addlf* and *striplf* are called filters.

To copy a file to an IBM disk use a command line similar to this:

```
OS9: PCWrite /D1/letter.txt
  </d0/letters/myletter
```

Notice that PCWrite gets its input from a file named myletter, in a directory named letters on a disk mounted in Drive /d0. It does that because the standard input path it reads has been redirected to receive information from the file. It stores the file letter in an IBM file named letter.txt on a disk mounted in Drive /d1.

In addition to the standard read and write operations, you can also format IBM disks and delete or rename IBM files with additional utilities in the package. Be careful with IBM filenames containing the characters special to the OS-9 Shell — !, # and &. You can only access files stored in the root directory of an IBM disk that uses hierarchical directories.

This Month's Listings

Gregory A. Law, who has contributed several OS-9 tips in the past, has contributed his version of Dennis Derringer's *Pager.B09*. The program first appeared in MOTD several months ago. Law modified the program to make it print 66 lines per page, rather than 67 and taught it to recognize a second procedure in the source code. When the new *Pager.B09* encounters an additional procedure, it skips to the next page and changes the header on the page to the name of the new procedure. The page numbering remains intact. He also corrected the way the program handles line numbers. Additionally, it prompts for an output device so you can use any parallel printer or even /TERM. Law challenges you to come up with a way to handle a BASIC09 program line in the form of:

```
IF variable=data THEN
  variable=null \ ENDIF
```

Presently, *Pager.B09* treats the rest of the program following this line as if it were still in the IF loop. In other words, *Pager* only recognizes control structure keywords when they are at the beginning of a line.

And here's another tip. Why not write this program so that it receives input from standard input and sends output to standard output. If you do this, you could use it as a filter. To make *Pager.B09* read from the standard input path, take out this line and the conditional code following it:

```
INPUT "File to list: "filename
```

To make *Pager.B09* send output to the standard output path, you must make similar changes. Take out the prompt for the output device and the code that uses it. Then, remove the following four lines:

```
OPEN #path, filename:READ
OPEN #printer,output:WRITE
CLOSE #path
CLOSE #printer
```

Then, early in the program add the following two lines:

```
      path:=0
      printer:=1
```

After you do this, the program gets input from the standard input path when it encounters the line, `"READ #path, line"`. Likewise, it sends output to the standard output path when it encounters any line containing `"print #printer"`.

Run *Pager.B09* with OS-9 command lines like this:

```
OS9: basic09 Pager
 <any_BASIC09_file >/P
OS9: basic09 Pager
 <more_BASIC09_Source >a_spooler_file
OS9: basic09 Pager
 <any_BASIC09_Source
```

The first command line sends its output to the printer. The second line saves the output in a file on disk which you can later print, and the last line sends the output to the Color Computer screen.

While you are typing *Pager.B09* into the CoCo you will find several program lines longer than the length of the screen. To get around this problem, type a linefeed character and continue to type the program line. Remember, do not press the ENTER or RETURN key after you press the linefeed key — just keep typing. To generate a linefeed character on the Color Computer, hold down the CLEAR key and press the 'J' key. BASIC09 will let you enter the long series of `IF . . . OR . . . OR . . . THEN` statements in *Pager.B09* if you do this. This series appears twice in the listing and both times the three lines of code in the listing should be entered as one line of code.

A New *line.c*

Law also modified the standard *line.c* program that comes with the Microware C compiler from Tandy. The program now paginates the listings at 66 lines per page and includes a header that prints the filename and pager number. He also gives you the ability to add the string `"/*page*/"` to your own code. When the *line.c* sees this string it automatically skips to the top of the next page. This is a handy feature since it allows a way to add a simple comment to programs to keep a routine from being listed on two pages.

Our final listing this month comes from Matthew Belmonte of Alexandria, Virginia. The listing *stat.a* is written in the RMA assembler format. RMA is the assembler called C.Asm in Microware C. It just might come in handy if you are trying to port C programs from UNIX over to OS-9. The short C program, *example.c*, shows how to use "stat( )" from within your own C programs. To link stat( ) with *example.c*, use the following command line.

```
c.link /d1/lib/cstart.r
example.r stat.r -0=/d1/
example -l=/d1/lib/clib.l
```

That's it for August! But, never fear, next month should be just as much fun as we try to come up with a way to organize your disks. Till then, keep on hacking! ☐

Listing 1: ***new.pager***

```
     (* BASIC09 Listing Utility *)
     (* Written by Dennis Derringer *)
     (* Modified by Greg Law *)

     DIM filename:STRING[20]; line:STRING[200]
     DIM temp:STRING[200]
     DIM xline:STRING[60]
     DIM path,printer,page,linecount,tabset:BYTE
     DIM proc:STRING[50]
     DIM output:STRING[5]
     DIM a,start,endpos:INTEGER
     DIM cnt:BYTE

     INPUT "Output device (/P): ",output
     IF output="" THEN
       output:="/p"
     ENDIF

     (* Main Loop *)
10   PRINT CHR$(12)
     PRINT "BASIC09 Listing Pager"
     PRINT "Type 'end' or press [ENTER] to exit"
     PRINT
     INPUT "File to list: ",filename
     IF filename="end" OR filename="END" OR filename="" THEN
       END
     ENDIF

     page:=1
     linecount:=1
     tabset:=10
     OPEN #path,filename:READ
     READ #path,line
     proc:=line
     OPEN #printer,output:WRITE
     GOSUB 100
     WHILE NOT(EOF(#path)) DO
       READ #path,line
       REPEAT
         start:=SUBSTR(CHR$(10),line)
         IF start<>0 THEN
           line:=LEFT$(line,start-1)+" "+MID$(line,start+1,200)
         ENDIF
       UNTIL start=0
       IF LEFT$(line,4)="ELSE" THEN
         PRINT #printer,TAB(tabset-2); line
         linecount:=linecount+1
       ELSE
         IF LEFT$(line,7)="ENDEXIT" OR LEFT$(line,5)="ENDIF" OR
           LEFT$(line ,7)="ENDLOOP" OR LEFT$(line,8)="ENDWHILE" OR
           LEFT$(line,5)="UNTIL" OR LEFT$(line,4)="NEXT" THEN
           tabset:=tabset-2
         ENDIF
         IF LEN(line)>60 THEN
           temp:=line
           xline:=LEFT$(line,60)
           start:=1
           endpos:=61
       REPEAT
         IF start=1 THEN
           a:=tabset
         ELSE
           a:=tabset+2
         ENDIF
         REPEAT
           endpos:=endpos-1
```

```
          UNTIL MID$(xline,endpos,1)=" " OR endpos>LEN(line) OR
           endpos=0
          IF endpos=0 THEN
           endpos=60
          ENDIF
          xline:=LEFT$(xline,endpos)
          line:=MID$(line,endpos+1,200)
          PRINT #printer,TAB(a); xline
          linecount:=linecount+1
          start:=endpos+1
          endpos:=61
          xline:=LEFT$(line,60)
         UNTIL line=""
         line:=temp
        ELSE
         IF ASC(line)<58 AND ASC(line)>46 THEN
          cnt:=1
          REPEAT
           xline:=LEFT$(line,cnt)
           cnt:=cnt+1
          UNTIL MID$(line,cnt,1)=" "
          line:=MID$(line,cnt+1,200)
          PRINT #printer,TAB(5); xline; TAB(tabset); line
          linecount:=linecount+1
         ELSE
          IF LEFT$(line,9)="PROCEDURE" THEN
           FOR a=1 TO 65-linecount
            PRINT #printer,CHR$(13);
           NEXT a
           proc:=line
           GOSUB 100
          ELSE
           PRINT #printer,TAB(tabset); line
           linecount:=linecount+1
          ENDIF
         ENDIF
        ENDIF
        IF LEFT$(line,2)="IF" OR LEFT$(line,6)="EXITIF" OR
         LEFT$(line,4) ="LOOP" OR LEFT$(line,5)="WHILE" OR
         LEFT$(line,6)="REPEAT" OR LEFT$ (line,3)="FOR" THEN
         tabset:=tabset+2
        ENDIF
       ENDIF
       IF linecount>60 THEN
        FOR a=1 TO 65-linecount
         PRINT #printer,CHR$(13);
        NEXT a
        GOSUB 100
       ENDIF
      ENDWHILE
      FOR a=1 TO 65-linecount
        PRINT #printer,CHR$(13);
      NEXT a
      CLOSE #path
      CLOSE #printer
      GOTO 10

      (* Subroutine to print page heading *)
100   PRINT #printer," "
      PRINT #printer USING "t10,s32,t65,'Page: ',i3",proc,page
      PRINT #printer,TAB(10); " Date / Time: "; DATE$
      PRINT #printer," "
      page:=page+1
      linecount:=3
     RETURN
```

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Listing 2: *line.c*

```
/* line: list lines of file with numbers */

#include <stdio.h>

main(argc,argv)
char **argv;
{
char line[256];
register int count = 0;
int linecount = 1;
int page = 1;
int a;

if(--argc)
if(freopen(*++argv,"r",stdin) == NULL) {
fprintf(stderr,"can't open file: %s\n",*argv);
exit(errno);
}

put_header(*argv, 1);
linecount = 4;
while(gets(line)) {
if(strncmp(line, "/*page*/", 8) != 0) {
printf("%5d  %s\n", ++count, line);
linecount++;
if(linecount > 64) {
for(a = 1 ; a <= 67 - linecount; a++)
printf("\n");
put_header(*argv, page++);
linecount = 4;
}
} else {
for(a=1; a <= 67 - linecount; a++)
printf('\n");
put_header(*argv, page++);
linecount = 4;

}
}
for(a = 1 ; a <= 67 - linecount; a++)
printf("\n");
}

put_header(line, page)
char *line;
int page;
{
printf("\n%-60sPage: %5d\n\n", line, page);
}
```

Listing 3: *stat.a*

```
*stat.a
*C stat() call for OS9
*by Matthew Belmonte
*860208
READ. equ %00000001
DIR. equ %10000000
 ifp1
 use /D1/DEFS/os9defs.a
 endc
 psect stat_a,0,0,0,0,0
 nam stat_a
 ttl stat
stat:
 pshs u,y
 ldd #-65
 lbsr _stkcheck make sure enough room
 leas -33,s for scratch area
 ldx 39,s pathname argument
 leau ,x points to filename
cpynam lda ,x+
 beq cpdone
 cmpa #'/
 bne cpynam
 leau ,x save addr of last '/'
 bra cpynam
cpdone lda ,u
 sta 1,s save char after the '/'
 lda #'.+$80 parent dir
 sta ,u replace it w/ '.'
 ldx 39,s
 lda #READ.+DIR.
 os9 I$OPEN open it
 sta ,s save dir path desc
 lda 1,s
 sta ,u restore filename
 lbcs error
find   lda ,s
```

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```
 leax 1,s buffer
 ldy #32 record length
 os9 I$READ directory
 bcs error
 leax 1,s
 leay ,u target filename
cmpnam lda ,x
 anda #%01111111 strip MSb
 cmpa ,y+
 bne find look @ next entry
 lda ,x+
 bpl cmpnam
 lda ,y must be same length
 bne find so check for '\0'
 lda ,s
 os9 I$CLOSE directory
 bcs error
 leax device,pcr "@"
 lda #READ.
 os9 I$OPEN
 bcs error
 sta ,s path desc
 ldx 30,s LSN (MS 16)
```

```
 lda 32,s LSN (LS 8)
 clrb
 tfr d,u
 lda ,s
 os9 I$SEEK
 bcs error
 ldx 41,s &stbuf argument
 ldy #$100 sizeof(stbuf)
 lda ,s
 os9 I$READ file desc sector
 bcs error
 lda ,s
 os9 I$CLOSE
 bcs error
 ldd #0 no error
clenup leas 33,s done w/ scratch area
 puls y,u,pc
error clra
 std errno error code
 ldd #-1 error flag
 bra clenup
device fcs "@"
 endsect
```

Listing 4: ***stat.demo***

```
/*a demonstration of the stat() call in OS9
  written by Matthew Belmonte*/
#include <stdio.h>
#include <direct.h>
main()
{
  int i, mask;
  char name[80];          /*pathlist*/
  struct fildes stbuf;  /*inode info*/
  static char attrb[] = {'d','s','e','w','r','e','w','r'};
  printf("filename? "); /*prompt*/
  scanf("%s",name);     /*get pathlist*/
  if(stat(name,&stbuf) == -1)  /*call stat()*/
    printf("stat: error!\n");
  else
    {
    printf("\nowned by %d\n",stbuf.fd_own);
    printf("created on %02d/%02d/%02d\n",stbuf.fd_dcr[0],stbuf.fd_dcr[1],
stbuf.fd_dcr[2]);
    printf("last modified on %02d/%02d/%02d at %02d:%02d\n",stbuf.fd_date[0],
stbuf.fd_date[1],stbuf.fd_date[2],stbuf.fd_date[3],stbuf.fd_date[4]);
    printf("%d links.\n",stbuf.fd_link);
    mask = 0X80;
    for(i = 0; i != 8; i++)
      {
      if(mask & stbuf.fd_att)
        putchar(attrb[i]);
      else
        putchar('-');
      mask >>= 1;
      }
    }
  }
```

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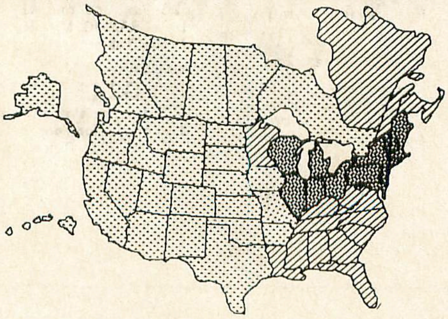

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ARE YOU LOOKING FOR A HI-RES GRAPHIC SCREEN PRINT DUMP?

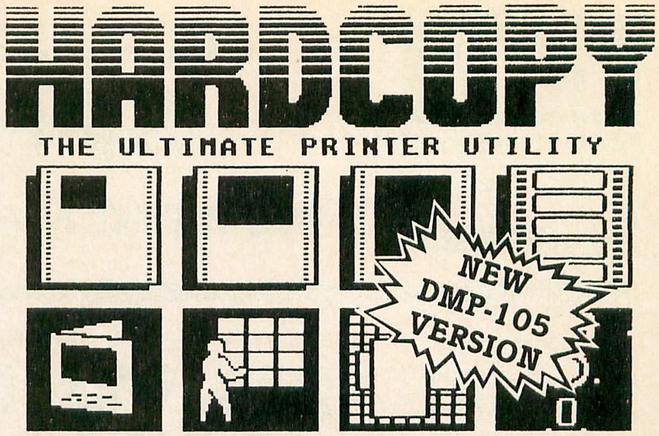
HARDCOPY - Hardcopy is more than just a screen print dump, compare these features with any ther graphic dump program on the market:

- Full GRAPHICOM/GRAPHICOM PART II compatibility! Loads STANDARD 6K images, GRAPHICOM pictures, and COCO MAX pictures too!
- BLACK & WHITE or GREY SCALE printing. In GREY SCALE printing, colors are printed as user definable patterns. Supports hi-res in all 4 GRAPHICOM display modes!
- **1x, 2x, 3x PRINTOUTS** - Three menu options are reserved for the most frequently used printout sizes; 1x (quarter page), 2x (half page), and 3x (full page).
- **GRAPHIC LABELS** - The label printing option allows the user to create custom mailing or disk labels with professional looking results.
- **GREETING CARDS** - The greeting card option allows the user to custom design greeting cards using both text and graphics.
- **GIANT POSTERS** - The poster option provides the user with a means of reproducing a hi-res graphic to a multi-sheet poster.
- **SPECIAL EFFECTS** - The special effects option allows the user to directly control the printing directives; ROTATION, X/Y SIZE, X/Y FLIP, X/Y GRID, X/Y FILL, TAB, WINDOW, POS/NEG IMAGE, and more!
- **USER CALL** - Have an application that **HARDCOPY** doesn't quite match? **HARDCOPY** routines can be added to EXTENDED BASIC through the USR command!

HARDCOPY* requires a 64K Color Computer or Color Computer II, and at least one disk drive.It supports 1 to 4 disk drives, keyboard or joystick input. Please specify **printer** and **cat. number** when ordering.

IDS 480/560-G	Cat. No. 170WD	Gemini 10X	Cat. No. 174WD
Oki 82A (Okigraph)	Cat. No. 179WD	Gemini SG-10/15	Cat. No. 178WD
Okidata 92	Cat. No. 171WD	DMP-105	Cat. No. 183WD
Epson LX-80	Cat. No. 173WD	DMP-110	Cat. No. 180WD
Epson MX-80	Cat. No. 172WD	DMP-120	Cat. No. 176WD
Epson RX-80	Cat. No. 173WD	DMP-130	Cat. No. 180WD
Epson FX-80	Cat. No. 173WD	DMP-200	Cat. No. 175WD
Riteman PLUS	Cat. No. 177WD	CGP-220	Cat. No. 181WD

* Due to hardware differences, some features may function differently on certain printers.



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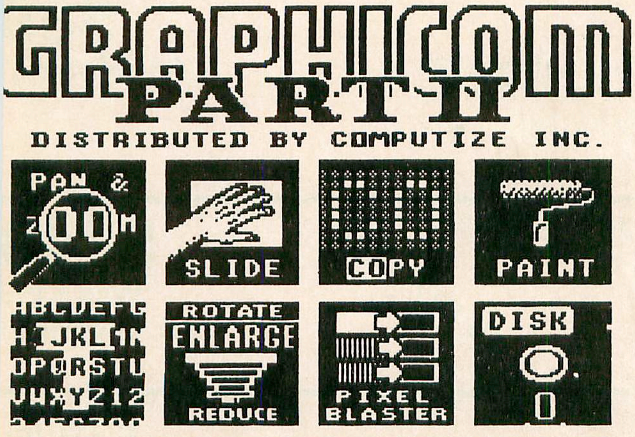
HARDCOPY PRINT UTILITY $29.95



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GRAPHICOM PART II $24.95

YOU COULD SPEND $100.00 OR MORE TO UPGRADE YOUR GRAPHICS SYSTEM, JUST BUY...

Eclipse (Zoom)	$19.95/Moreton Bay
Super Paint (Paint)	$19.95/Michtron
Shrinx (Reducer)	$21.95/Grafx
Text Master (Hi-Res Text)	$29.95/Data Man
G.C.U. (Disk Utilities)	$19.95 Computize

OR YOU COULD SPEND $24.95 FOR GRAPHICOM PART II AND GET:

a video processing package that provides many functions that are missing in Graphicom. Here are just a few of the features provided by Graphicom Part II:

ENLARGE/REDUCE/ROTATE
Enlarge or reduce any portion of a graphic screen, just like a photographic enlarger! Rotate by any degree or fraction of a degree around any point on the screen.

PAINT
Paint or "fill-in" any irregular area on the screen! More than 50 different colored patterns available. Additional paint patterns may be user-defined.

PAN & ZOOM
"Zoom in" x2, x4, or x8 on any portion of the screen to do fine pixel work. Allows editing of Graphicom character sets with ease!

TYPESETTER & FONT EDITOR
Add text in 16 different sizes, also supports user definable foreground & background colors. Design & Edit characters for use in the typesetter.

PIXEL BLASTER
Allows the user to easily substitute or remove colors. Widen lines, swap BLUE & RED without effecting BLACK & WHITE, etc.

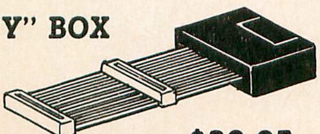
GRAPHICOM PART II DOES NOT REQUIRE GRAPHICOM TO RUN!

Graphicom Part II requires a 64K extended disk basic system, and supports 1 to 4 disk drives, keyboard or joystick (analog or switch type) input. It will load and save both **Standard BIN** files and **Graphicom** screens. All functions support color or Hi-Res operation, as well as the 4 screen display modes.

NEW LOW PRICE! GRAPHICOM DIGITIZER $159.00

Input directly into Graphicom for easy enhancements, manipulation, stamping, and storage. Accepts composite video signal in (1.0v p-p) from video camera, VCR, video disc player, another computer, or other compatible video sources. View "off air" or "VCR" digitized video at close to real-time. "Snapshot" video frames to the digitizer's internal memory. No slow, data serial manipulation.
Use with your multi-pak, "Y" box, or a "Y" cable ("Y" cable available at $19.95) Video is input via a "BNC" connector.
External controls for HORIZONTAL POSITION, VERTICAL POSITION, HORIZONTAL WIDTH, BRIGHTNESS, and CONTRAST (FUZZ) settings.
Don't be fooled by imitations...this is the GRAPHICOM VIDEO DIGITIZER . . . the **only** digitizer that "DIRECTLY" inputs into Graphicom
REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS. FREE GRAPHICOM PROGRAM, PICTURE DISK, AND GRAPHICOM UTILITY SUPPLIED WITH PURCHASE OF VIDEO DIGITIZER (A $50 VALUE).

"Y" BOX



$29.95

GRAPHICOM $24.95

Catalog No. 111GD
Simply stated - One of the finest graphic programs written for the Color Computer!
FEATURES:

- S-U-P-E-R U-S-E-R F-R-I-E-N-D-L-Y !
- Supports 4 Hi-Res display modes
- 4 page animation mode
- Color Palette with over 15 color patterns for use with Hi-Res artifact
- Send/Receive pictures over modem
- Supplied utility allows capturing Hi-Res screens from most COCO arcade games
- Multiple Hi-Res character fonts (user redefinable)
- Supplied utility for transferring Graphicom screens to Basic or other M/L programs.
- Supplied utility for loading screens from Basic or other sources
- Built in Hi-Res SCREEN PRINT (compatible with EPSON, C-ITOH, GEMINI-10, OKI, plus Radio Shack's LP-VII, LP-VIII, DMP-100, DMP-200, and GCP-115 printers) from 110 to 9600 baud
- SEND/RECEIVE slow-scan television
- Many additional features, operating hints, hardware mod's and suggestions, etc.

REQUIRES 64K COCO, 1 DISK DRIVE, AND 2 ANALOG JOYSTICKS

NEW MASTER KEY II

New Improved Version! A hardware product that takes control of any program regardless of protection. Now use with RS Multi-pak, "Y" cable or **optional** extender cable. Captures register contants as they were when Master Key II was engaged. Complete disassembler, memory save, and much more. Requires some familiarity with Assembly Language.

ROM PAK Cat. No. 160HR . . . . $ 99.95
Cat. No. 161HR With Ext. Cable . . . $109.95

PICTURE DISK SETS

Available from COMPUTIZE

4C - Artifact color palette
5C - Large character sets (from Derringer Software)
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7 - Miscellaneous Art Set #1
8 - Miscellaneous Art Set #2
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Picture Disk Set 2 . . . . $19.95
10 - Miscellaneous Fonts
11C - Artifact color palette type fonts
Picture Disk Set 3 . . . . $14.95
12C - Art demo from WHITESMITH
13C - GRAPHICOM PART II function demo
Picture Disk Set 4 . . . . $14.95

GC II FONT DISKS

Each disk contains 10 or more fonts. (4 versions of each font, one for each display mode).

14C - GCII Fonts Disk #1
15C - GCII Fonts Disk #2
16C - GCII Fonts Disk #3
GRAPHICOM PART II Font Disks . . . $19.95

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Transfer contents of disk to tape • Transfer contents of tape to disk • Automatically relocates cassette programs that conflict with the disk operating system • Displays machine language program addresses • Copies ASCII, Basic, & Machine Language Programs • All contained in 1 menu driven program!

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Disk $24.95 . . . . Cat. No. 105CD

SUPER BACK-UP UTILITY ©

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SUPER BACK-UP UTILITY WILL PERFORM **ALL** OF THE FOLLOWING FUNCTIONS:

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2. **TAPE TO DISK** (Move Cassette programs to Disk!)
3. **AUTO RELOCATE** (For those Cassette programs that conflict with Disk operating systems.)
4. **DISK TO TAPE** (Place Disk programs onto Cassette)
5. **DISK TO DISK** (Our powerful Split-N-Image Program, Copies regardless of most protection schemes!)

- **MENU DRIVEN**
- **REQUIRES 32K EXTENDED COCO**
- **REQUIRES 1 OR 2 DRIVES**
- **ALL MACHINE LANGUAGE!!!**

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SPIT-N-IMAGE ©

M/L Disk Back-Up Utility

There is no need to suffer the heartbreak of crashed disks any longer. Spit-N-Image will create a mirror image of your valuable disk programs which do not respond to normal back-up functions. Will also initialize and back-up in one pass. Data processing experts always insist on having a back-up — it's good a practice.

REQUIRES 32K CC
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- 12" Zenith 123A Green Screen is easy on the eyes
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- 30 day warranty at over 1200 Zenith repair locations

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($7 shipping)

pbj Word Pack RS

This ROM pack is the hardware answer for an 80 column display. It includes a built-in video controller to drive a monochrome monitor like our 123A. To get started, you need OS-9 2.0, a Y cable or multipack interface, drive 0, and a monochrome monitor.

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- Medium resolution 200 x 240 dots
- Built in speaker
- 2 year warranty

40 COLUMN

$149
Was $359
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W-2	$\$29.^{95}$
941	$\$29.^{95}$
VIP Intergrated Library	$125. Was $149. ($2 shipping)

J&M CONTROLLER

**JFD-CP
with JDOS**

- Metal case: I/O buffered
- Parallel port for Gemini and Epson printers
- Hard Disk driver included
- Single switch lets you switch from JDOS to RS DOS
- Gold contacts & data separator

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($2 shipping)

RS DOS ROM

- ROM chip makes J&M compatible
- 24 pin fits both versions of J&M controller
- Release 1.1

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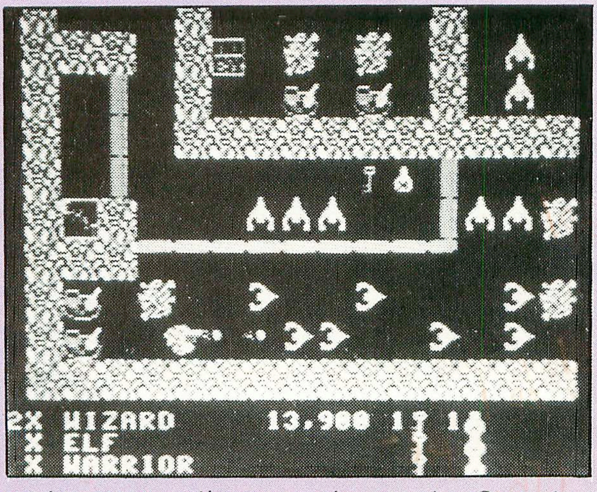
DIECOM PRODUCTS

GANTELET

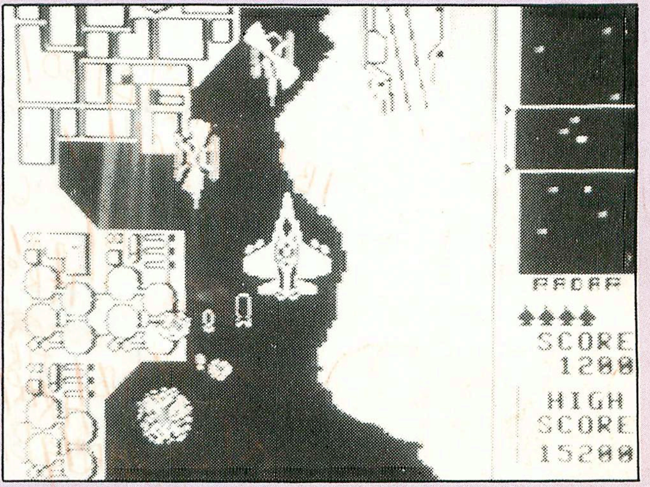


One, two or even three people can play Gantelet at the same time. You and your friends travel through the many levels in search of an exit to the next level. Avoid the Ghosts and other creatures that are out to stop you in your quest. Collect keys to open doors, treasures and magic potions to aid you in your battle. Watch out for hidden traps as you frantically search for the exit to the next level.

64 k required
tape or disk

$28.95 U.S.
$38.95 Can.

Mission: F-16 ASSAULT

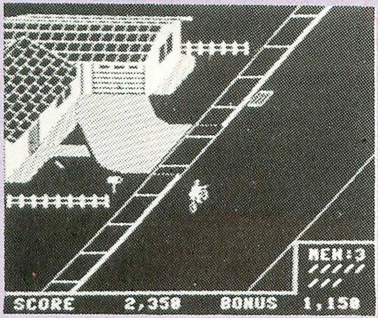


Fly your plane over land and water while avoiding enemy missiles, planes and helicopters attacking from the top and bottom of the screen. Use your radar to track objects as they approach the main screen. Bomb oil refineries, airports and destroy planes before they can take off from the airports. Watch out for missiles fired from hidden missile silos on the ground. Dozens of screens of detailed terrain plus increasing difficulty make this a great game for everyone.

64 k and joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

PAPER ROUTE

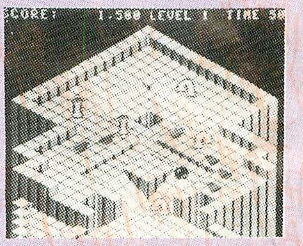


As a paper boy, you ride your bike along your route delivering papers to your customers. Break customers' windows or damage their property and they will cancel their subscriptions! Earn bonus points by damaging non-subscribers' property. Avoid pedestrians, cars, and maybe even a mad dog in your attempt to deliver all of your papers! Detailed graphics and lots of surprises make this game a real challenge for everyone.

64 k
joystick required
tape or disk

$28.95 U.S.
$38.95 Can.

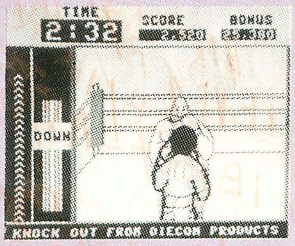
MARBLE MAZE



Move your marble around the mazes in your search for the finish line! Avoid marble eaters, acid puddles and other creatures that inhabit the mazes. Eight different levels and great graphics make this game a must for your collection.

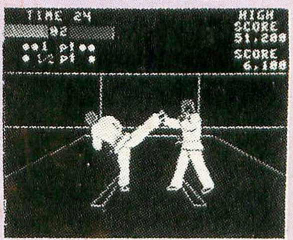
joystick required

KNOCK OUT



Fight against five different boxers in this great boxing game! At first the boxers are easy to knock out, but beware, it gets harder as you move on. The boxers are out to stop you in your quest to become champion of the world. Outstanding graphics make this a must for your collection!

KARATE



Challenge the computer, or a friend to a Karate match! Use various Karate punches and kicks to knock your opponent down and earn points to win the match. When challenging the computer, your opponent's Karate skills increase as you win matches. This game is a challenge for even the expert game player.

joystick required

64 k required **tape or disk** **$28.95** U.S. **$38.95** Can.

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HEAT UP YOUR COCO!

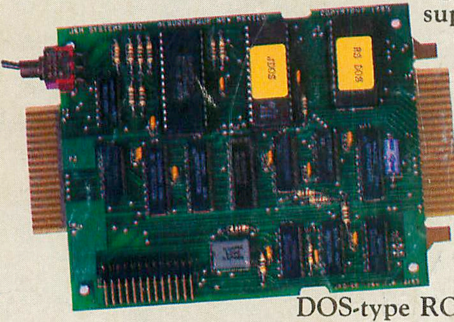
New HARD DRIVES

Besides the obvious advantage of increased disk access speeds and a vast amount of storage, our COCO hard drives boast many innovative features. For instance, you may boot OS/9 directly from JDOS - no intermediate boot floppy is required. Our software can run with virtually any winchester with a ST412 type interface. Our drives have capacities of 5, 10, or 20 MBytes (formatted), and may be either partitioned into up to 7 logical units or left as one large logical unit. Our COCO hard drive systems are complete with case, power supply, cables, OS/9 drivers, and instructions. Prerequisite: OS/9, JFD-CP controller.

5¼" 5 MByte full size	$495
5¼" 10 MByte ½ size	$650
3½" 20 MByte (shown above)	$795

JFD-CP DISK CONTROLLER

Our new JFD-CP, compatible with both the original COCO and the COCO 2, features a parallel port to support a Centronics compatible printer or our hard drive, and an external ROM switch, which allows you to select JDOS or an optional RS DOS-type ROM. It comes in a case and includes JDOS 1.2 and manual. JDOS implements all RS DOS commands, plus many more, including auto line numbering, error trapping, baud rate selection, OS/9* boot from floppy or hard drive, and Memory Minder**, our disk drive analysis program (Precision Alignment Disk not included).



JFD-CP Disk Controller with JDOS	$139

COCO-CLASSIC

Our old JFD-COCO controller remains a strong seller. Some people just like old "classics" best! So we have brought it back at the lowest price ever!

JFD-COCO Disk Controller with JDOS	$99

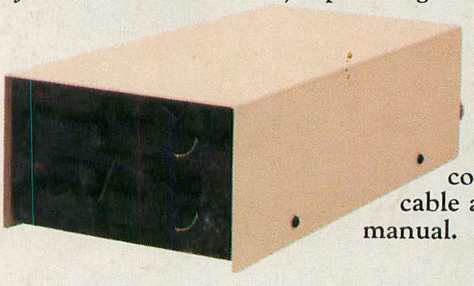
New TERMS

One-year warranty on parts & labor; 30-day money back guarantee (except shipping) if not totally satisfied. Items must be returned in like new condition.

Free shipping via UPS in continental United States for payment by VISA, MasterCard, or cashiers check. COD requires 10% prepayment by bank card plus 3% shipping. Blue Label and foreign shipping extra.

DRIVE SYSTEMS

Upgrade your Color Computer by adding our new JFD-CP disk controller, supercharged with JDOS 1.2 operating system, and a top quality drive with case and power supply. Comes complete with cable and JDOS manual.



Drive 0 System with one single side drive	$279
Drive 0 System with one double side drive	$349
Drive 0,1 System with two single side drives	$389
Drive 0,1 System with two double side drives	$489

MEMORY MINDER**

Memory Minder is a disk drive test program now included in JDOS. Used with a Precision Alignment Disk, Memory Minder allows you to check your drives for speed, alignment, sensitivity, hysteresis, and more! You can actually align or adjust the drives while viewing the graphics on the screen. No special equipment needed!

PRECISION ALIGNMENT DISKS (From Dysan)	
PAD-40X1: Tests single side disk drives	$26
PAD-40X2: Tests double/single disk drives	$33

Memory Minder is available on diskette for those who don't own a JFD-CP controller with JDOS. Includes Precision Alignment disk.

Memory Minder: single side package	$59
Memory Minder: single/double side package	$75

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